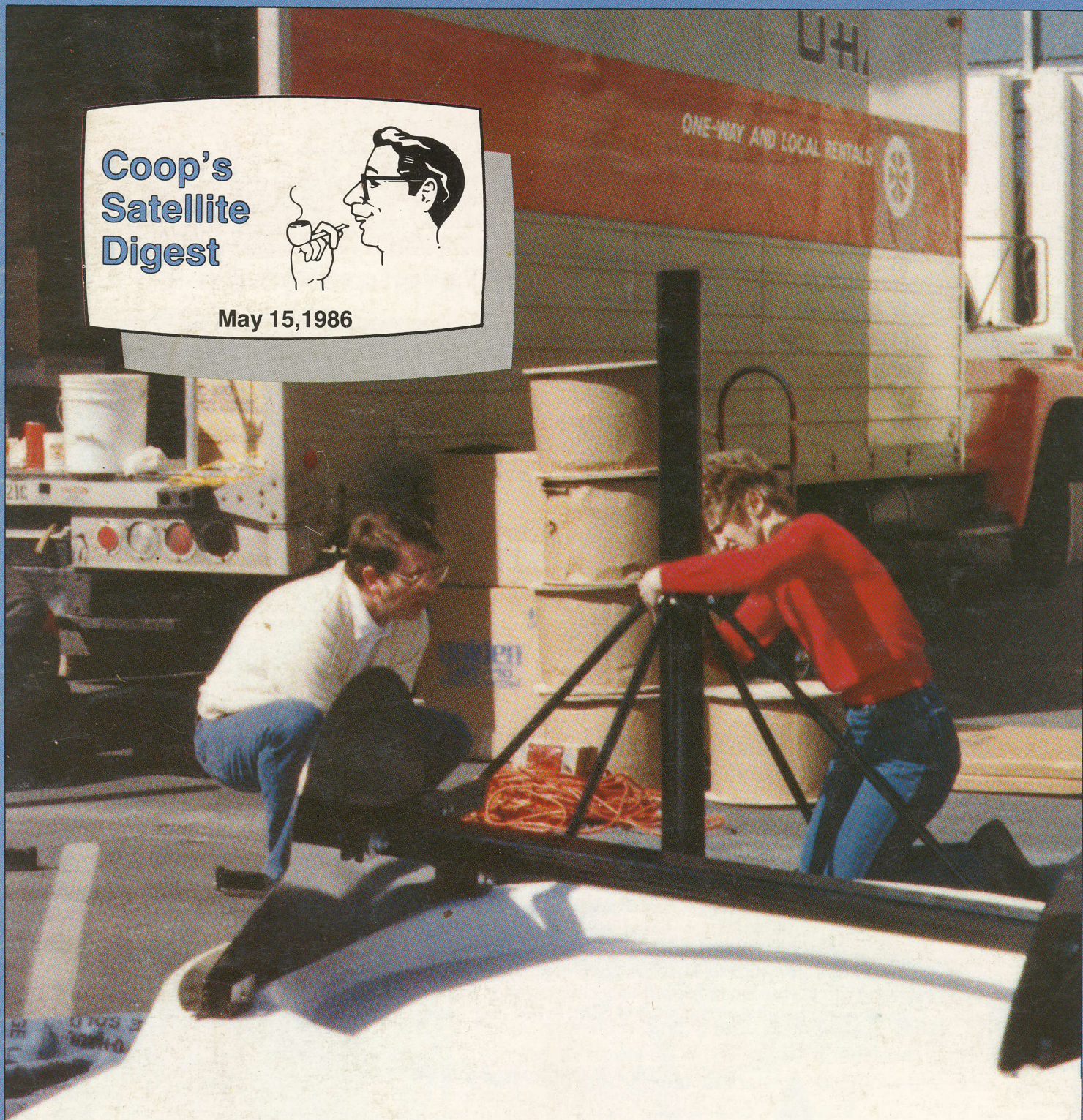


**Coop's  
Satellite  
Digest**



**May 15, 1986**



**TVRO Motor Drives**

**Antenna Basics, Part II**

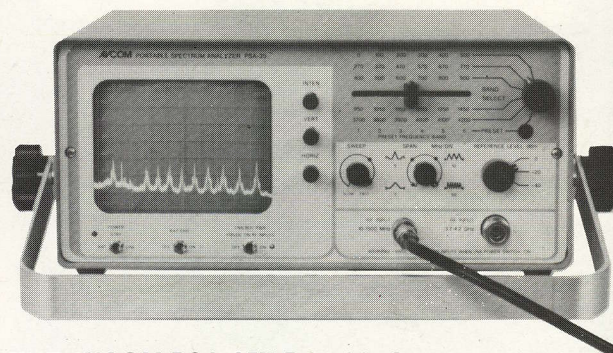


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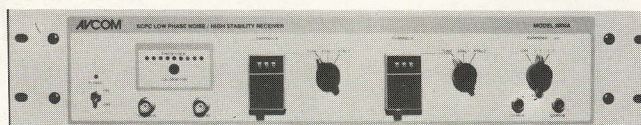
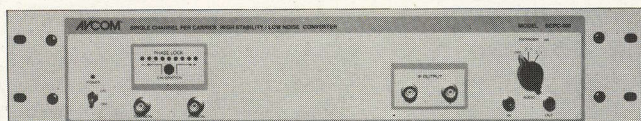
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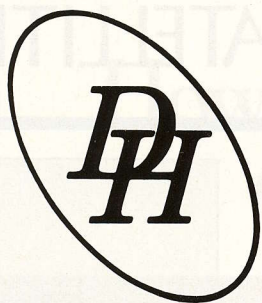
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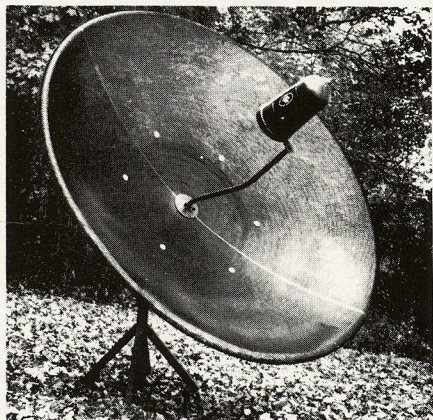
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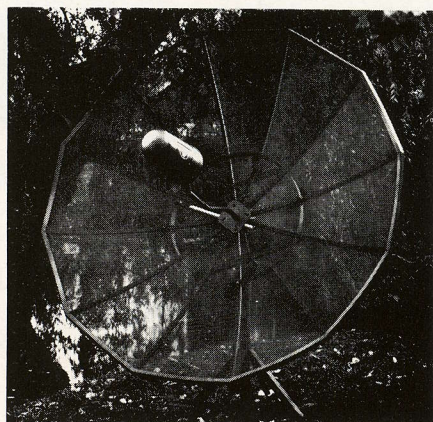
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**MAY  
1986**

**COOP'S**

**SATELLITE DIGEST**

**OUR COVER/** Antennas, like the proverbial spring flowers, are slowly coming back into 'bloom' as the long winter cold snap is relaxing over most of the USA. Yes, business is regaining some of its former strength.

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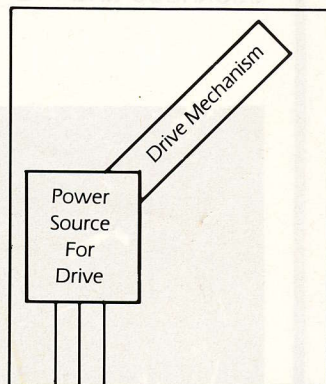
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# Coop's Comments



## The Making Of The Avcom Commercial

Patti and I found ourselves home on Provo in mid-March with an extra assignment: create a documentary training (video) tape for Avcom, dealing with the proper use of spectrum analyzers. I had begun warehousing videotape from such locations as Lexington, Kentucky, and Indianapolis last fall on the subject of TI. The basic field pieces I would need could be shot in and around Fort Lauderdale, using TVRO dealer Frank Abruzzo and his trusted assistant Alli Lake. It would be hard to create a full tape on TI detection and cures here on Providenciales since we have no 4 GHz terrestrial microwave within 600 miles.

Then, as an after thought, it was also decided that a television commercial for use on Boresight and Satellite Showtime might be a good 'small project' while we were shooting and editing the one hour documentary anyhow. Television commercials being what they are in this industry at this point in time, you point a camera at a person talking about some exotic, new piece of equipment. If you get very creative, you shoot the same monologue from two different angles and then edit it together to make it look like you were on a big budget using two separate cameras.

Well, one day after arriving on Provo, Patti reminded me of the promise to do the commercial and I grunted something to the effect, "Oh yeah, we'll have to remember to do that." And think about it I did—for about 60 seconds. So she reminded me again. "Let's not do a traditional commercial," she suggested. I grunted again.

Not doing a traditional commercial simply means that you start with a clean slate: no preconceptions of what the commercial should say or how it says it. "Let's somehow use this beach and the beautiful scenery," Patti suggested. "Maybe we can find somebody here to do the audio and appear in the commercial," she went on. We were lying in the sunshine on the beach at the time this serious discussion was going on. Several nudes from Club Med wandered by—I was beginning to see the possibilities here.

Club Med, in the last year, has introduced nude sunbathing to our tranquil island. People still wear clothing in town, thank God, but virtually anyplace else you are likely to find people in various stages of undress. Marshall Foiles, who runs things for us down here, observes, "I am totally numbed by nudity; the only time I even glance back to look more closely is when there are two people, one of each sex, both are nude, and they are engaging in an ancient exercise ritual. Otherwise, I don't even look back." I know, that seems difficult to believe. I would have the chance to prove that to myself and to Patti, however.

So how do we find a pair of 'models' for our Avcom spectrum analyzer commercial? Patti suggested we just sit on the beach in front of our home and 'interview' people who walked by nude. Yes, we were going to have a shot at making a 'nude commercial' for Avcom. No, we weren't too sure how Andy Hatfield was going to react to seeing his

product displayed with raw flesh next to it. We'd find out.

After a few hours of watching nudes, we tired of that exercise and decided that most of the people who come to Club Med have traveled here out of desperation; for whatever physical or emotional reason, they are on a short rope and probably desperate for attention. We hadn't seen anything of the 'quality' we needed for the commercial. So we were ready to give up on the concept. But as luck would have it, we found ourselves shopping for groceries and Patti bumped into a couple at the check-out counter. She found out that they were staying at a local hotel and offered them a ride back to their hotel since we were going in that direction anyhow. This would turn out to be a very fortunate meeting.

William Mitchell and 'Shirina' are in the publishing business. They live in New York City but moved there only six months ago from London. He is very English, an Oxford graduate. She is a graphic designer, and I could not help but notice that Shirina was a very classy 'graphic design' all by herself. They confided to us that they liked to vacation where they could shuck all clothing and explore deserted beaches in the buff. Totally nude. That seemed like a harmless hobby to me.

So we asked them if they would be interested in modeling for us for a test commercial, and would Bill read the commercial copy to go with it? Naturally, we offered to pay them since modeling is a business like anything else, and they agreed. That was mid-afternoon on a Thursday. Patti and I had to hurry home and write and outline the shots for a complete TV commercial series, before 8:30 AM the next morning.

Our weather is always nice, but sometimes it is nicer than nice. Friday morning turned out to be the best of the best; virtually dead calm on land and sea, no clouds to mar the sun's rays, and most of the equipment was working properly. Our models were on time, and we went to work. Up to this point, no mention of nudity in the commercial.

The commercial message was simple enough; anyone purchasing an Avcom PSA-35 spectrum analyzer from the distributor, Satellite Video Services, before June 14th would be eligible for seven days and seven nights at Treasure Beach Resort in the Turks and Caicos Islands. The commercial was to simply alert people to this special bonus and to cause them to telephone Satellite Video Services for full details.

To create this message, we wanted to have Bill and Shirina look relaxed and comfortable on the beach. A PSA-35 would always be close by, just as if everyone carried their own spectrum analyzer to the beach all of the time. I tried to explain that to our models.

"How about Shirina and I doing the commercial nude?" asked Mitchell. I glanced quickly at Patti. She was looking down at the ground. I knew what she was thinking.

"Well, actually Patti and I had talked about how we could liven up the commercial," I offered. We had located a small bikini bathing suit

Coop/continued on page 25



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# ANTENNA BASICS

## Part Two

by Jim Vines

### Gain, Illumination and Noise Temperature

An antenna that sees with equal amplitude in all directions (up and down, left and right, and front and back) is called an 'isotropic radiator' (diagram 13). Such an antenna exists in theory only, yet it is a convenient and precise reference against which the directivity (gain) of microwave (including TVRO) antennas is measured.

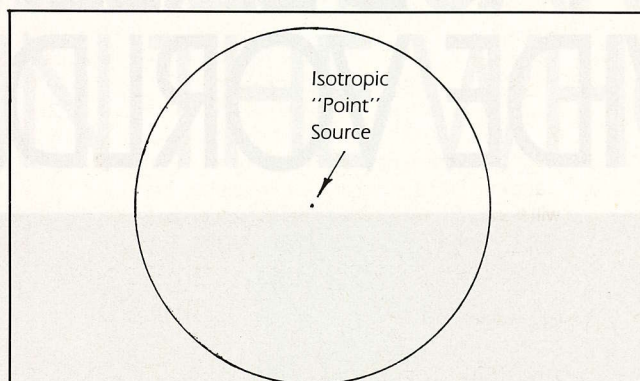
Microwave antenna gain is stated in dBi—decibels over an 'isotropic source.' At VHF frequencies and lower, it is more customary to state antenna gain in reference to a tuned half-wave dipole (dB-d or simply dB) (diagram 14). A half-wave dipole has a radiation or 'seeing' pattern that is best described as doughnut-like or torroidal; and its gain when referenced to an isotropic radiator is 2.15 dBi. Referenced to itself, that gain of a half-wave dipole is OdB-d (or dB). Similarly, an isotropic radiator when self-referenced has a gain of zero dBi.

While surface accuracy is the essential ingredient all home satellite antennas must have for high gain and low side lobe levels, that alone isn't enough. To take full advantage of an accurately contoured dish surface, the feed should illuminate the dish as evenly as possible with as abrupt a cut-off as possible at the dish edge. Ideally the feed would illuminate the dish with equal amplitude from center to edge with an abrupt, total cut-off at the dish edge. The 'ideal' home satellite antenna would thus feature 100 percent illumination efficiency.

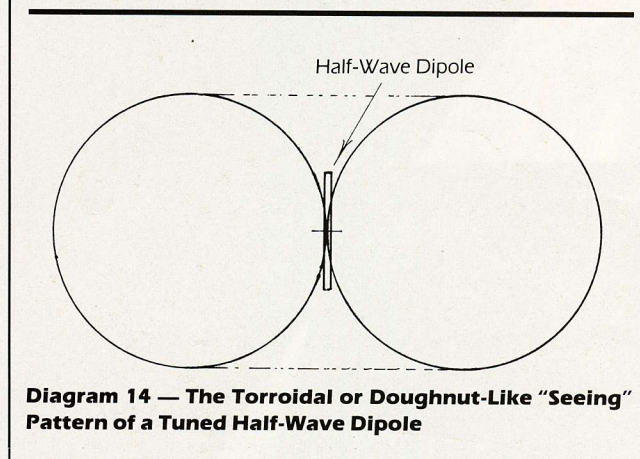
Several factors prevent the achievement of 100 percent illumination efficiency. The feed, first of all, is hottest in the central region of the dish and it does see to some degree beyond the dish edge (thus detecting thermal noise from the ground as well as terrestrial microwave interference). The feed and its supports also create a sudden 'discontinuity' or interruption within the incoming satellite RF wavefront, further reducing illumination efficiency and increasing the antenna's noise temperature. Without such interruptions the perfect dish would concentrate 84 percent of the incoming RF wavefront in its main lobe with the remaining 16 percent falling into the side lobes. Because of the shadowing or discontinuity caused by the feed and its supports, less than 84 percent of the RF energy is concentrated in the main lobe and more than 16 percent winds up in the side lobes.

So while a very good feed may achieve almost 80 percent illumination efficiency, the feed and its supports cause a reduction in net efficiency. All discontinuities, sudden or gradual, have a defocussing or phase-altering effect on the RF wavefront, and so constitute minor VSWR mismatches. With all mismatches, including those that occur within the feed and the ones that are caused by the dish surface imperfections, the best net illumination that can be extracted from a prime focus antenna is about 70 percent; or a little less for small dishes (under 6-8 feet) because the feed cannot be 'shrunk.' In "Beyond Brute Gain," we will investigate the comprehensive performance enhancements that are possible by way of 'offsetting' the feed and its supports so that the RF wavefront remains undisturbed.

Another factor that prevents an 'evenly illuminating' feed from actually seeing all of the dish evenly is space attenuation. This is the 'divergence factor,' and it is relatively more severe for deeper dishes



**Diagram 13 — The Spherical "Seeing" Pattern Of An Isotropic Radiator**



**Diagram 14 — The Torroidal or Doughnut-Like "Seeing" Pattern of a Tuned Half-Wave Dipole**

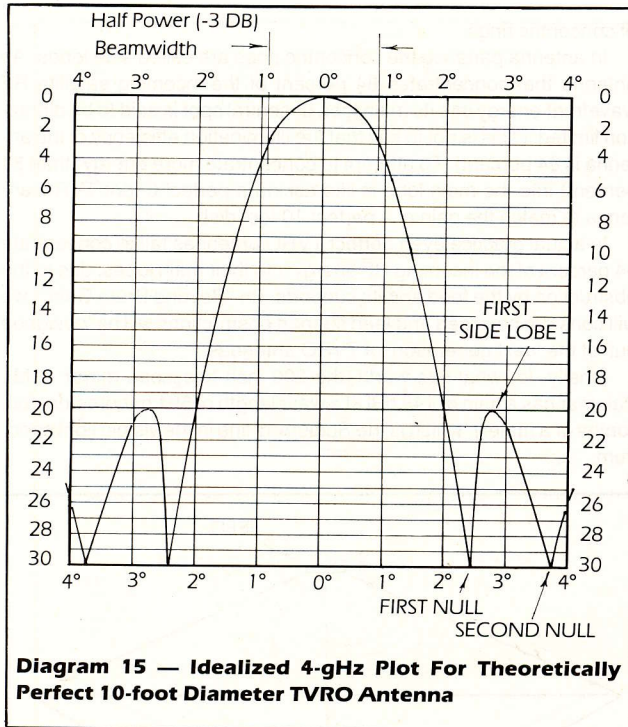
than for shallow ones. To overcome the divergence factor and achieve 100 percent illumination efficiency the feed would have to be progressively more sensitive away from the dish center going out to the dish edge. Finally, like the feed and its supports, the edge of the dish itself is a discontinuity which is best left 'unseen' as much as possible by the feed.

"Folded Path" designs such as cassegrain and gregorian achieve compounded f/d ratios of 1.5 more thus reducing the 'divergence factor' and achieving net illumination efficiencies of as much as 76 and 77 percent. Because these designs require a fairly large subreflector (which cannot be shrunk for smaller dish sizes), their break-even point with prime focus antennas occurs at about 20 feet at 4 GHz (or 7 feet at 12 GHz). The antenna designer who "does his homework" takes extra time with his feed OEM supplier to select a feed whose edge taper characteristics best match his dish's focal length-to-diameter (f/D) ratio. For example, equipping a dish whose f/D ratio is .4 (subtended angle in front of feed = 127 degrees) with a feed intended for a dish f/D ratio of .3 (subtended angle = 160 degrees) will result in rather severe 'spillover' illumination.

The consequence of spillover illumination is an increase in the antenna's noise temperature. In addition to seeing satellites, the antenna now sees more of the 'thermal glare' of ground, foliage, buildings, etc. By analogy, we might imagine the black sky being 'greyed' or to a greater or lesser degree and so reducing the contrast between satellites and surrounding sky. Ideally the satellites would appear to '4 GHz eyes' as bright white pinpoints strung across the southern sky from east to west. The sky would be black and the ground would be invisible or at most a dull grey.

The following 'mental exercise' may prove helpful. Imagine being able to see the world at 4 GHz: at only 3 degrees Kelvin the sky over-





head is black with the barest suggestion of grey. As you lower your gaze toward the horizon the entire sky is washed out by the 'blinding iridescence' of the Earth, glaring with a brightness of 250-300 degrees Kelvin. Cupping your hands about your '4 GHz eyes' restores a measure of blackness to the sky, allowing a view of that curious string of small dots: the satellites that populate the Clarke Orbit Belt.

At 4 GHz, trees and buildings will also glow. Now suppose our vantage point is situated beneath a Ma Bell microwave path. Even if the source is hidden from direct view the buildings and trees that shield us from direct exposure will be brightly silhouetted, so brightly in fact that we must again cup our eyes to avoid being blinded.

The ability (or inability) of a home satellite antenna to obtain a high contrast view of satellites at any look angle relative to the horizon's thermal glare can be measured in degrees Kelvin. Typical noise temperature values for 4 to 40 foot diameter dishes are furnished in Table 3 which also provides G/T values.

G/T in a different forum, the term "system G/T figure of merit" is undoubtedly discussed in greater depth. Nevertheless, no discussion of home satellite antennas can ignore the subject of system G/T, since the antenna is the main factor in determining how high (or low) the system G/T is.

As several scenarios will demonstrate, system G/T—not antenna gain—is what bears a decibel-for-decibel relationship with receiver carrier-to-noise ratio (CNR). System noise temperature (Ts) includes antenna noise temperature, LNA noise temperature, and (if necessary) cable attenuation; in short, anything that can impact on system performance. The system G/T figures of merit for various dish/LNA combinations ignores coaxial cable losses since it is assumed that an adequate LNA gain is used to overcome line losses.

$G/T = \text{Gain of antenna minus } 10 \log (\text{System noise temperature})$   
OR  $G/T = G_a - 10 \log (T_s)$

Example: The antenna under consideration is a high performance 10 foot instrument with 40.4 dBi gain, and its noise temperature at a look angle of 40 degrees is 36 degrees Kelvin. The LNA attached to the feed has a noise temperature of 80 degrees Kelvin. Now to replace the letters in the formula with numbers:

$$G/T = 40.4 - 10 \log (36 \text{ degrees K} + 80 \text{ degrees K})$$

$$G/T = 40.4 - 10 \log (116 \text{ degrees K})$$

To obtain a '10 log' value for 116 degrees K, we produce table 4:

System Temperature (Ts)	10 Log
506° Kelvin	= 27
400	= 26
315	= 25
253	= 24
200	= 23
158	= 22
126	= 21
100	= 20
79	= 19
63	= 18
50	= 17

**TABLE 4 — Obtaining "10 log" value from system noise temperature (Ts).**

The 'Ts' for the 10 foot antenna and 80 degree K LNA was found to be 116 degrees K (36 degrees K + 80 degrees K). Converting 116 degrees K (which is between 100 degrees K and 126 degrees K in Table 4) we should obtain a '10 log' value of about 20.6; which we can now 'plus in' to the formula:

$$G/T = 40.4 - 20.6$$

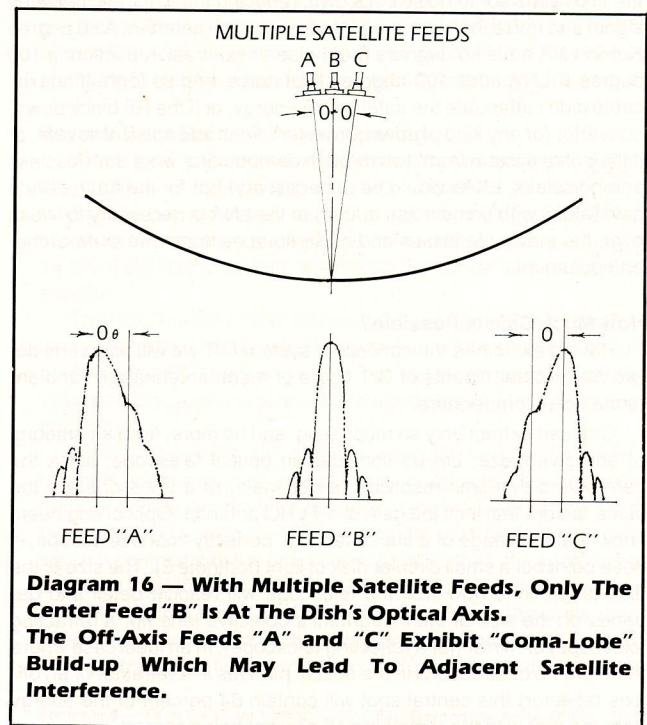
$$G/T = 19.8 \text{ dB/K (decibels/Kelvin)}$$

Is a system G/T of 19.8 dB/K enough to 'drive' the receiver above its carrier-to-noise (CNR) threshold, so that the last traces of 'hits' of impulse noise are absent from the output video? There is a convenient formula for finding CNR values:

$$\text{CNR} = \text{EIRP} + G/T - \text{Path Loss Factor}$$

Where EIRP is the effective isotropic radiated power from the satellite transponder, expressed in decibel watts (dBw). A fairly typical value for much of the USA is 34 dBw.

$$\text{Thus: CNR} = 34.0 \text{ dBw} + 19.8 \text{ dB/K} - \text{Path Loss Factor}$$





Path Loss Factor varies with satellite look angle above horizon; the path length from TVRO site to a satellite straight overhead (possible only at the Equator) is less than the path length to a satellite near to the horizon. For this scenario, the satellite look angle is 44 degrees and the receiver's IF bandwidth (BW) is 30 MHz. To obtain a numerical value for the Path Loss Factor, we present Table 5.

**PATH LOSS FACTOR**

Look Angle	BW=36MHz	BW=30MHz	BW=25MHz	BW=16MHz
90°	42.51	41.72	40.93	39.01
78°	42.53	41.74	40.95	39.03
67°	42.63	41.84	41.05	39.13
55°	42.76	41.97	41.18	39.26
44°	42.96	42.17	41.38	39.46
33°	43.16	42.37	41.58	39.66
22°	43.36	42.57	41.78	39.86
11°	43.56	42.77	41.98	40.06
1°	43.81	43.02	42.23	40.23

**TABLE 5**—Path Loss Factor as a function of look angle and receiver IF Bandwidth.

Armed with the information from Table 5, the numerical value for the Path Loss Factor can be inserted in the CNR formula:

$$\text{CNR} = 34.0 \text{ dBw} + 19.8 \text{ dB/K} - 42.17$$

$$\text{CNR} = 11.63 \text{ dB}$$

For a receiver whose real world CNR threshold is 9 dB, the resulting margin of 2.63 dB (11.63-9.0) is enough to banish the last 'hits' of impulse noise from the brightest reds and hottest pinks to appear on screen.

## LNA Gain And System G/T

By now someone is asking, "Why not include LNA gain in the G/T equation?" Why not indeed; after all, the LNA does amplify. It amplifies what the antenna sees—both signals and noise. But then the LNA adds some noise of its own, reducing the 'contrast' between signal and noise that was 'presented' to it by the antenna. A 60 degree Kelvin LNA adds 60 degrees K of noise or 'contrast' reduction; a 100 degree K LNA adds 100 degrees K of noise, and so forth. If coaxial cable didn't attenuate the satellite RF energy, or if the RF block down-converter (or any kind of downconverter) didn't add noise of its own, or if the entire system from dish through demodulator were both lossless and noiseless, LNAs would be unnecessary! But for the future, brute gain (albeit with some noise added) of the LNA is necessary to 'wash over' the inevitable losses and noise sources in current state-of-the-art equipment.

## How Much Gain Is Possible?

Having examined the concept of system G/T we will now consider two major determinants of G/T figure of merit; antenna gain and antenna noise temperature.

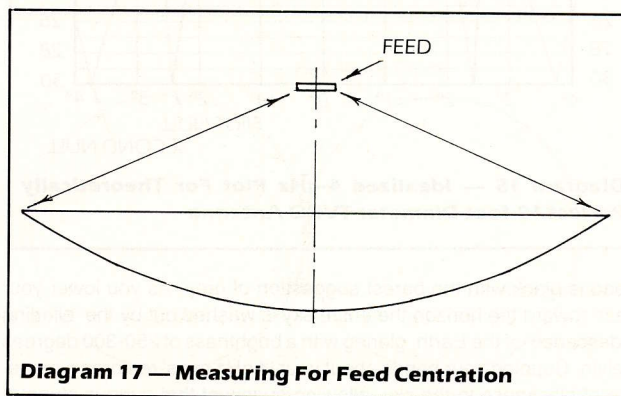
One can extract only so much gain, and no more, from an antenna of any given size. Let us consider an optical telescope, since the parameters that limit resolving power (gain) of a telescope are the same factors that limit the gain of a TVRO antenna. Optical engineers know that the image of a star, even in a 'perfectly' made telescope, is not a point but a small circular disk of light (footnote 3). The size of the disk determines how well the telescope will resolve detail and depends on the size of the instrument's objective lens (for a refracting telescope) or mirror (for a reflecting telescope). In an ideal case where there are no obstructions in the optical path (as in a refractor or an off-axis reflector) this central spot will contain 84 percent of the energy from the star with the remaining 16 percent being spread in a system

of concentric rings.

In antenna parlance the concentric rings are called side lobes. An antenna that concentrates 84 percent of the incoming satellite RF wavefront energy into its main lobe or central spot is said to be diffraction limited. (This is not to say that the illumination efficiency of the antenna is 84 percent). To attempt to concentrate more energy (than 84 percent) into the main lobe is like asking a perfect 8 foot TVRO antenna to match the gain of a perfect 10 foot dish.

In actual practice even perfect TVRO antennas fail to concentrate 84 percent of the incoming RF energy into their main lobes, due to the obstruction by the feed and its supports. (In "Beyond Brute Gain," we will consider how feed and feed support obstructions will be 'designed out' of the 'next generation' of TVRO antennas.)

Finally, for what it is worth, the 200 inch telescope mirror at Mt. Palomar has a gain of 148 dBi at a wavelength of 591 nanometers (billionths of a meter); which is the Sodium 'd' line in the visible light spectrum.



## Antenna Noise Temperature

The difference in relative amplitude or strength of the TVRO antenna's main and minor (side) lobes determines how 'contrasty' the satellites 'appear' to the antenna. Very low sidelobe levels (relative to the main lobe) mean that the antenna is less likely to be blinded by the off-axis interference from adjacent satellites, ground noise (heat) or Ma Bell. The noise temperature for most regions of the sky is 3 degrees Kelvin. This is the echo from the Big Bang at the creation of the Universe, generally thought to have occurred 15 billion years ago.

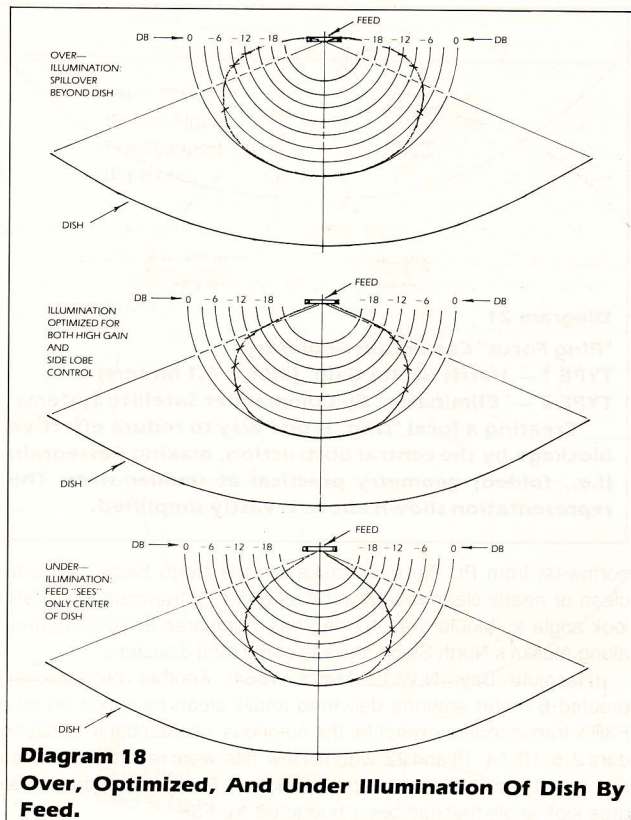
The ground temperature ranges from 233 degrees K (-40 degrees C, -40 degrees F) to 323 degrees K (50 degrees C, 122 degrees F) within the contiguous 48 United States, which should explain why the ground at 4 GHz is so much 'brighter' than the sky. The sky is very nearly Absolute Zero (no thermal activity) and so it is essentially black as 'seen' by a 4 GHz TVRO antenna. 'Working' the satellites at the low to ultra-low (under 5 degree) look angles typical in the High Arctic calls for very low antenna side lobe levels. Otherwise 'bird hunting' near the horizon is a little like trying to identify your closest friend when he's pointing a flashlight at you.

The first requisite for side lobe control is a very accurate dish surface. Having achieved that, selection of the feed as discussed earlier is important. There are cases where side lobe suppression is more important than maximum gain or a normal balance between gain and side lobe suppression. Where terrestrial microwave interference is severe it is desirable to use a feed that under-illuminates the dish (diagram 18, bottom example).

Considerable controversy has developed over the trendy use of short f/D ratios to obtain higher gain with lower side lobes/lower noise temperatures. As shown in diagram 19, with short f/D ratios the dish

Footnote 3—"Diffraction Effects by Obstructions in Reflecting Telescopes of Modest Size" by Edgar Everhart, University of Connecticut Physics Department; and Joseph W. Kantorski, American Optical Company Research Division—Astronomical Journal, December 1959.





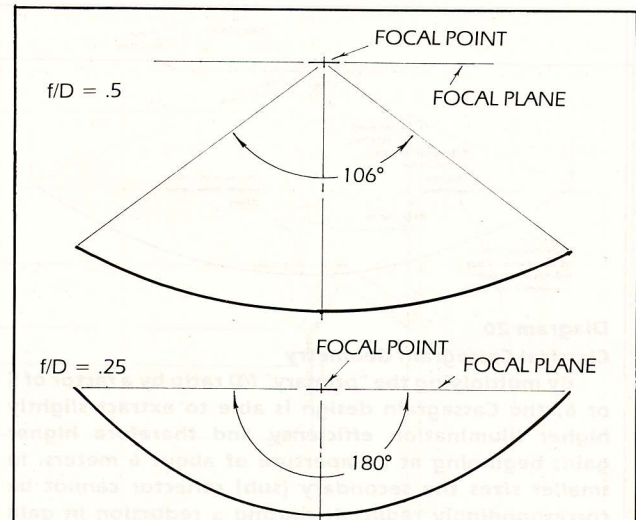
subtends a greater angle across the feed's 'field of view.' A feed with wider peripheral vision must be specified to adequately illuminate a dish having a short  $f/D$  ratio.

It is tempting to discuss the pros and cons of 'deep-dishing' in greater detail. Where small dishes are required for reasons of space or cost, a short (.3 or less)  $f/D$  ratio may render better system G/Ts. This may not be so much due to the optical geometry afforded by deep-dishing as it is to the greater rigidity (contour retention) it makes possible. Another commonly overlooked advantage of deep-dishing is the greater ease with which the feed can be supported at the exact focal point of the deep dish.

An average dish,  $f/D$  ratio of .375 for example, can provide exceptionally good low look angle performance, as documented (footnote 4) in CSD and CSD/2 by this writer. The relative failure of several expensive US built 5 and 6 meter cassegrain antennas in the low look angle viewing conditions (nearby) in the High Arctic may have been due not so much to their cassegrain design per se, but to the added complexity of the design which is best left to an experienced installer.

Earlier we demonstrated a simple formula to calculate system G/T. Consider a pair of neighboring TVROs with identical dishes, LNAs, and receivers. However 'A' has a feed which was selected for

	TVROA	TVROB
Antenna Diameter	10 Ft	10 Ft
Edge Taper of Feed	= High Gain	= Low Side Lobes
Antenna Gain	40.6 dBi	40.0 dBi
LNA Noise Temp	80°K	80°K
Antenna Noise Temp(40°)	40°K	25°K
Antenna Noise Temp(10°)	100°K	40°K
System G/T (40°K)	19.9 dB/K	19.8 dB/K
System G/T (10°K)	18.1 dB/K	19.3 dB/K



When  $f/D = .25$

The Dish Rim Is Even With Its Focal Plane. Hence The Designation Of "Focal Plane Antenna."

**Diagram 19 — The Angle Subtended By The Dish Across The Feed's "Field Of View" Increases As The Dish's Focal Length — To — Diameter Ratio Is Decreased. The Selection And Design of TVRO Feeds Must Take The Dish's  $f/D$  Ratio Into Account. Generally A Shorter (Deeper)  $f/D$  Ratio Results In Lower "Noise Temperature," Particularly At Low "Look Angles"—With A Slight Reduction In Gain (Because At Deep  $f/D$  Ratios The "Dish" Is Harder To Illuminate.) Surface Accuracy Is At Least Equally Important In Minimizing Side Lobes And Noise Temperature.**

maximum dish illumination while 'B' has a feed that was chosen for low side lobe levels. While A & B are equal at a 40 degree look angle, B enjoys a significant 1.2 dB/K advantage when both are aimed to 10 degrees elevations. This scenario takes on a special urgency for TVRO installers in New England and the Canadian Maritime Provinces who are trying to access good reception from Satcom F3R and Galaxy 1.

#### Beyond Brute Gain—2 Degree Spacing

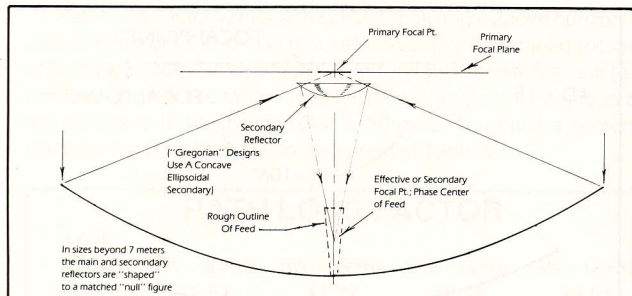
With 2 (or 2-1/2) degree satellite spacing fast becoming the norm, the problem of maintaining adequate carrier-to-interference (C/I) ratios goes beyond merely guarding against next door satellites. The summed or combined strengths of the satellites across a fairly wide swath of sky has to be kept well below the carrier level of the desired satellite.

The FCC's latest (1983) 29 minus 25 Log Theta Spec describes an 'envelope' within which satellite up-and-downlink antennas should be confined. the FCC rules allow for a few 'spikes' to poke through the envelope so long as the antenna's averaged pattern 'sums out' within the envelope.

Optical engineers call this the 'modular transfer function.' For example, camera lenses are no longer rated solely by the maximum number of lines per mm they can barely resolve; instead they are rated by the method known as MTF or modular transfer function: by what percent contrast can the lens render parallel lines of a specified spacing at the focal (film) plane of the cameras? One hundred percent contrast means that there is no spillover of black into the white area between lines and vice versa. It is more desirable for example to achieve 90% contrast at 50 lines/mm with a rapid image breakdown at 60 lines/

Footnote 4—"TV at the Outer Limits," CSD 9/83. "Beyond the Arctic Circle," CSD-2 8/84.





**Diagram 20**

## Classical Cassegrain Geometry

By multiplying the "primary" f/D ratio by a factor of 5 or 6, the Cassegrain design is able to extract slightly higher illumination efficiency and therefore higher gain; beginning at an aperture of about 6 meters. In smaller sizes the secondary (sub) reflector cannot be correspondingly reduced; causing a reduction in gain and higher side lobe levels — particularly so adjacent to the main lobe. Although Cassegrain antennas have higher noise temperatures than equal-size prime focus antennas — their large size guarantees respectable noise temperatures (providing that their "cumulative" optical accuracy is held to very tight tolerances).

For "uplink" stations, Cassegrain geometry is chosen for convenience; as the HPAs can be bolted directly to the rear flange of the feed.

mm than to barely resolve line detail at 70 lines/mm and yet only achieve 30% contrast at 50 lines/mm.

In the modern 4 GHz world, the 29 minus 25 Log Theta specification requires a TVRO antenna to achieve a very high 'MTF' contrast rating at a spacing density of one satellite per two degrees.

With alternating polarization schemes, adjacent satellites can be separated with satisfactory contrast providing that the TVRO feed is accurately centered on the dish's optical axis (Diagrams 16 & 17) and that the feed's cross-pole isolation is reasonably well maintained out to  $\pm 6$  or 8 degrees off axis. The reflective surface of the dish must be very accurate both cross-sectionally and axially (free of rim wow). Which leads to the following question:

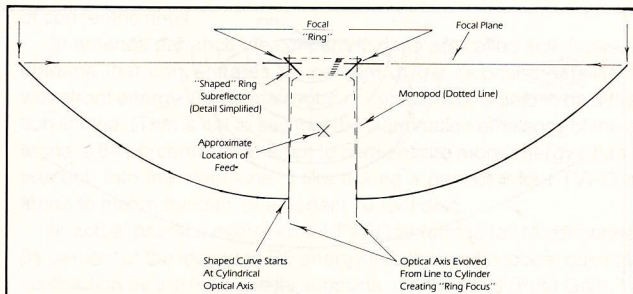
## Antenna Specs—Just Ink On Paper, Or...?

(Skagway, Alaska-August 1981.) The owner of two CATV systems bought a second (and vastly lower cost) 6 meter TVRO antenna for his 'headend' in nearby Haines. Although several complete LNA/receiver switchovers were done, it became obvious that the lower cost antenna (which was carefully "proofed" at the job site for accuracy) delivered better quality reception on Satcom F1.

(Alaska North Slope, 1983). Approximately one dozen expensive 5 meter TVRO antennas failed to deliver satisfactory reception on Satcom F3R at an equal number on Innit settlements. The Innit refused to pay for the installations.

(Tuktoyaktuk, N.W.T., April 1983). This writer witnessed the installation of one of his 6 meter TVRO antennas at Gulf Oil/BeauDril's new High Arctic (Tuktoyaktuk) base camp; on the shore of the Arctic Ocean. The carefully proofed 6 meter dish delivered clean reception on all of Satcom F3R's transponders. Guests from neighboring Dome Petroleum's base camp, boasting of a much costlier 6.1 meter name brand TVRO with slightly more sensitive electronics, visited our hosts at the Gulf camp to compare reception quality. "You get better pictures!" a visitor exclaimed. "We get clear pictures on only six channels!"

(Mould Bay, N.W.T., March 1984) A super-knocked-down 4.85 meter antenna, proofed by this writer at this site located 700 miles



**Diagram 21**

## "Ring Focus" Cassegrain Geometry

TYPE 1 — Harris "Delta Gain" (3.05 & 6.1 Meters)

TYPE 2 — "Eliminator" By Commander Satellite Systems

Creating a focal "ring" is one way to reduce effective blockage by the central obstruction, making Cassegrain (i.e., folded) geometry practical at smaller sizes. The representation shown above is vastly simplified.

northwest from Pt. Barrow, Alaska (on the North Slope), provided clean or nearly clean reception on all of F3R's transponders. F3R's look angle at 'Mould' was 4.7 degrees, compared to 10-12 degrees along Alaska's North Slope: the site of the Innit disasters.

(Resolute Bay, N.W.T., March 1984) Another professionally proofed 6 meter antenna delivered totally clean reception on all of F3R's transponders except for the notorious 'second bank' transponders 2, 6, 10, 14, 18 and 22, where a few 'hits' were recorded. A distant rise called Martyr Point ate up a precious 1.5 degrees of the 3.5 degree look angle that had been 'budgeted' for F3R.

The gain, noise temperature, and side lobe specs for the high priced name brand antennas suggest that all should have delivered better reception quality than they actually did. Had the name brand manufacturers "fudged" their test results? Absolutely not. The problem with specs, anybody's specs, is that they constitute a 'type' test. They are supposed to give a certain type or model of antenna a clean 'bill of health.' The test is totally valid only for the sample submitted for testing. Most importantly, trained installers assemble antennas for range tests.

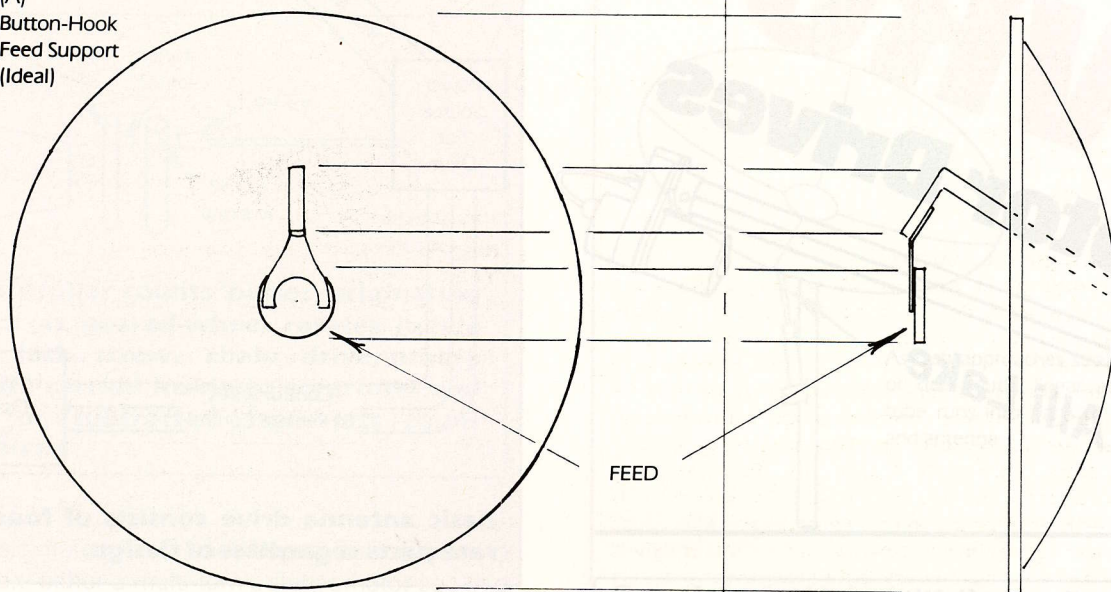
While not every production line sample of a given manufacturer's antenna may not go together exactly the same, at least they should be nearly equal if both are assembled with reasonable care; even if by different installers.



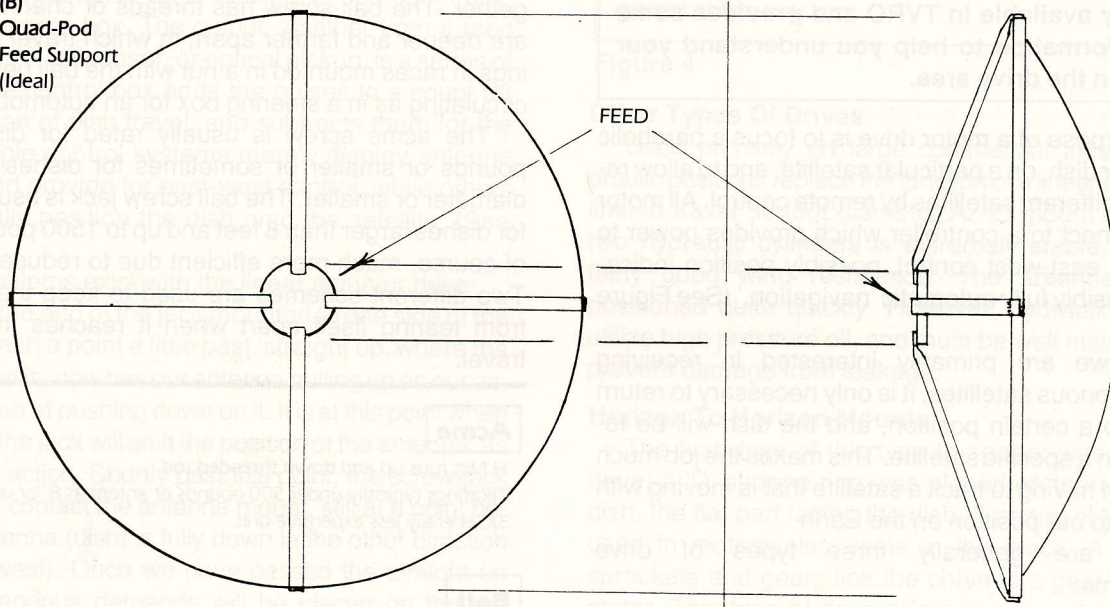
**HIGH MICROWAVE signal levels at this Harris dish exist because of significant number of point to point microwave sources located on tower directly behind dish. The 'light' from the microwave sources can be 'blinding' to the dish trying to resolve 4 GHz satellite signals some 24,000 (+) miles away.**



(A)  
Button-Hook  
Feed Support  
(Ideal)



(B)  
Quad-Pod  
Feed Support  
(Ideal)



**Diagram 22**

**Feed supports should radiate rapidly away from the feed. "Close encounters" between the feed and its support alter the feed's VSWR and illumination pattern, adversely affecting antenna gain and side lobes.**

**Some button-hook supports practically touch the scalar rings of the feed.**

**No feed-LNA combination can be perfectly VSWR impedance matched; and there will always be one or two VSWR "spikes" within the 3.7-4.2 GHz band which can be intensified by a too-close button-hook support. Non-isolated LNAs require the best impedance match possible with the feed, another reason why feed support design requires careful attention.**



# TVRO Motor Drives

by Alli Lake



Lake, a frequent contributor to CSD, studies the various types of motor drive mechanisms presently available in TVRO and provides some basic information to help you understand your options in the drive area.

The purpose of a motor drive is to focus a parabolic antenna, or dish, on a particular satellite, and to allow reception of different satellites by remote control. All motor drives connect to a controller which provides power to the motor, east-west control, possibly position indication, or possibly fully automatic 'navigation.' (See Figure 1.)

Since we are primarily interested in receiving geosynchronous satellites, it is only necessary to return the dish to a certain position, and the dish will be focused upon a specific satellite. This makes the job much easier than having to track a satellite that is moving with reference to our position on the Earth.

There are generally three types of drive mechanisms:

- A) Motorized jack screw, or linear actuator.
- B) Hydraulic.
- C) Chain drive and other horizon to horizon drives.

We will first discuss the jack screw or linear actuator. This consists of a motor and gear assembly connected to a screw-jack assembly which accomplishes the same type of motion as the hand-crank which was more popular in days past, when fewer satellites were present. The internal construction of the tube is usually one of two types; acme screw or ball screw. (See Figure 2.)

The acme is essentially a nut that travels up and down a threaded rod, with the threads quite close to-

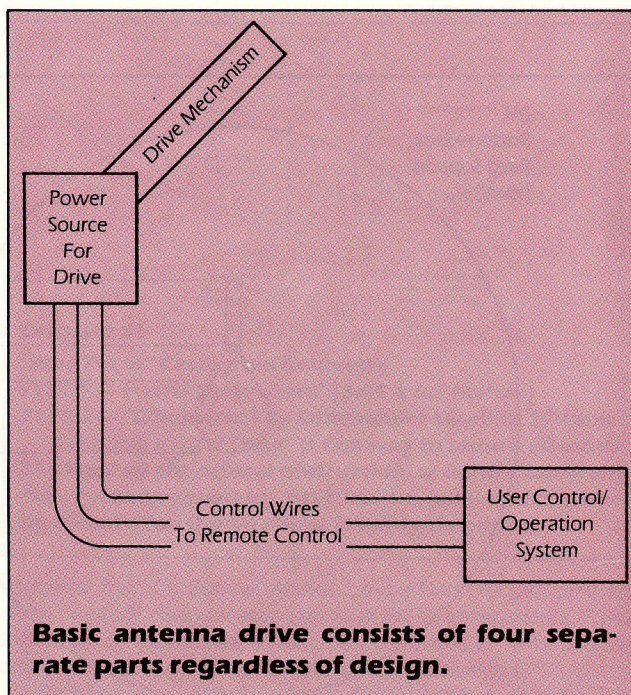


Figure 1

gether. The ball screw has threads or channels which are deeper and farther apart, in which travel ball bearings in races mounted in a nut with the ball bearings recirculating as in a steering box for an automobile.

The acme screw is usually rated for dishes 500 pounds or smaller or sometimes for dishes 8 feet in diameter or smaller. The ball screw jack is usually rated for dishes larger than 8 feet and up to 1500 pounds. It is, of course, much more efficient due to reduced friction. Two different schemes are used to keep the actuator from tearing itself apart when it reaches the end of travel.

## Acme

- 1) Nut runs up and down threaded rod.
- 2) Ratings typically under 500 pounds or antennas 8' or under.
- 3) Generally less expensive unit.

## Ball

- 1) Ball-bearing operating similar to auto steering box.
- 2) Ratings generally to 1500 pounds, or antennas to 15'.
- 3) Generally more expensive unit.

Figure 2

In one, a slip clutch is used in the gearbox and when more than a preset amount of torque is required, the clutch 'ratchets,' which protects the motor, gears and tube. This system provides some protection to the dish if something has been placed under it that should not be there, i.e., a bicycle. The second method employs cams and micro-switches to shut down motor power at preset



physical limits. This also allows us to prevent the dish from striking a house, tree, etc., at one end of the arc by preventing full in-out travel of the jack.

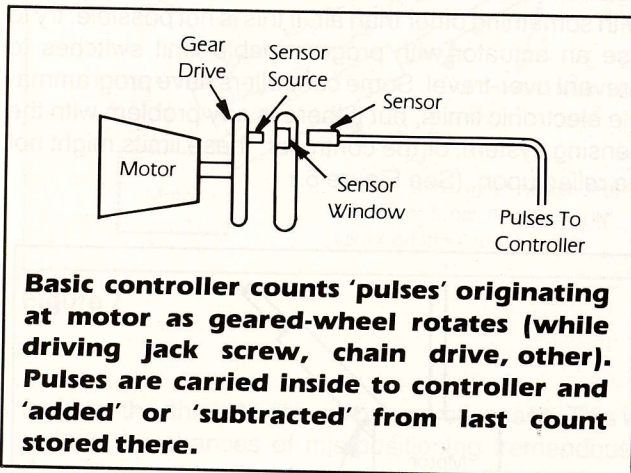


Figure 3

Two basic methods are used to provide feedback to a control box; either a multi-turn potentiometer tied into the gear box, or a magnetic or optical device which is periodically interrupted by a rotating wheel, again driven from the gear box. The output, whether from a reed switch, Hall effect sensor, or optical pickup, is a series of pulses. The control box adds the pulses to a count for one direction of dish travel, and subtracts them for the other. Simple control systems merely display antenna position and provide for east-west control, while others automatically position the dish onto the satellite. (See Figure 3.)

Two problems exist with the linear actuator drive:

- 1) With the end of the jack mounted to one side of the dish, we reach a point a little past 'straight up' where the center of gravity now has our antenna pulling up on our actuator instead of pushing down on it. It is at this point when any play in the jack will shift the position of the antenna, as would wind action. Shortly past this point, the screw-jack will actually contact the antenna mount, still at a point before the antenna (dish) is fully down in the other direction (east and west). Once we have passed the straight up point, tremendous demands will be placed on the actuator, which limits us to a fixed amount of travel, maybe 90 degrees.

- 2) Any dish using a linear actuator is limited in the amount of travel possible, and thus is prevented from seeing every satellite visible from the location of the dish; for example, future domestic satellites to the east, the Intelsats visible from North America and the Russian Ghorizont bird. To obtain all satellites without removing a linear actuator and attaching it to the other side of the dish means that a different type of drive must be used. This is the so-called horizon to horizon drive system. (See Figure 4.)

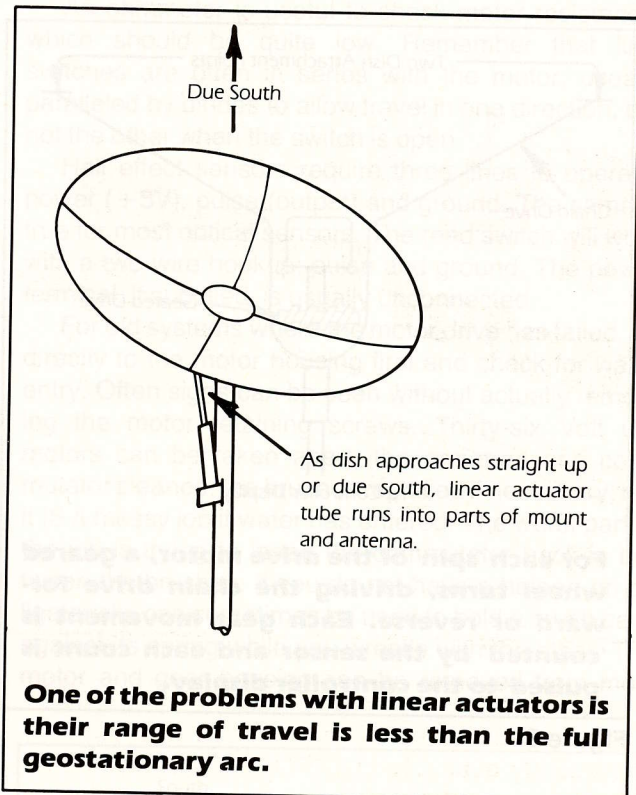


Figure 4

### Other Types Of Drives

Used primarily on large commercial antennas, hydraulic positions replace the function of a linear actuator. A limited travel 30 foot diameter Az-El mount dish using two hydraulic cylinders is extremely stable, having a fairly good wind resistance. The antenna can be positioned quite quickly. However, hydraulic systems utilize high pressure oil, and must be well maintained to prevent damage from leakage.

### Horizon To Horizon Mounts

The first drive of this type to appear was the chain drive; a 'D' shaped ring was placed on the rear of the dish, the flat part facing the dish. A chain, of the variety used in motorcycles, rests in this track. A series of sprockets and gears link the chain to a gear-reduction motor. This type of drive offers superior strength over the linear actuator because the dish is supported from two sides. Also, the dish can now be swung through the entire arc, approaching the horizon, with the design of the mount and antenna determining the minimum look angle.

Again, a pulse-counting sensing system can be geared into the motor for position feedback or a potentiometer used for the same purpose. Another type of drive of this type uses a cogged belt instead of a chain. Still another has a half-gear protruding from the rear of the antenna, and a wormgear attached to the motor for drive.



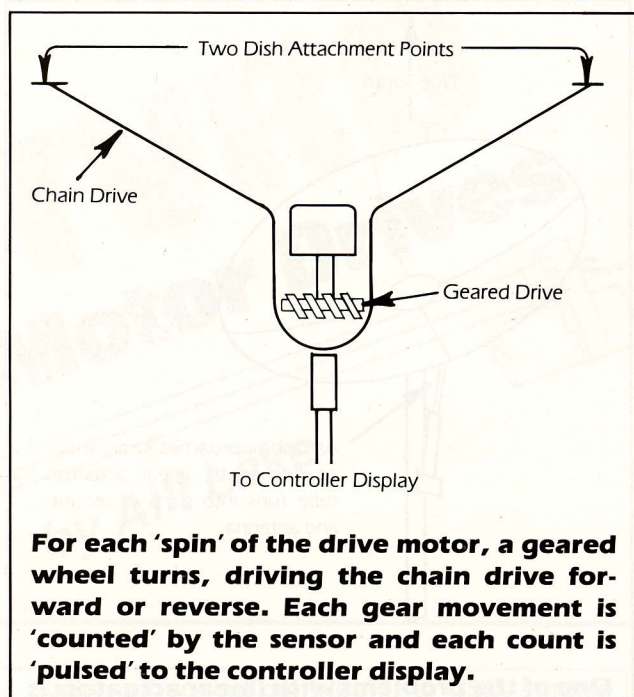


Figure 5

## Controller Systems

The simplest controller system includes a motor power supply, usually 36 volts DC, east/west (up/down) control buttons, and a digital position display. The display is either pulse-count driven in Hall effect/reed switch/optical systems, or simply indicates voltage in potentiometer systems. Regardless, the user records the position numbers for each desired satellite when the system is installed. When it is desired to access another satellite, the appropriate button is pressed and held as the dish moves until the desired number is reached. At this point, the user releases the east or west button and dish motion ceases. (See Figure 5.)

In the programmable systems each satellite is located at the time of installation and the location stored into memory. The internal count (or voltage) is memorized by the unit and when the user wishes to access a satellite, he merely steps through a list of names in memory or directly presses keys corresponding to the name and number of the satellite. The positioner automatically initiates dish motion and stops on the desired satellite. Parental lock-out on programmable drives and some east/west units is a feature available on these types of systems. Most programmable units are quite a bit more sophisticated internally than the east/west with position indication units.

## Installation Procedures

When installing a linear actuator, take care not to mount the tube so that lateral or side-loading force is placed upon the tube. This would place a strain on the

unit that it is not intended to handle, and will also void the warranty. Insure that full extension or retraction of the actuator tube will not place the dish antenna in contact with something other than air. If this is not possible, try to use an actuator with programmable limit switches to prevent over-travel. Some controllers have programmable electronic limits, but if there is any problem with the sensing system, or the controller, these limits might not be relied upon. (See Figure 6.)

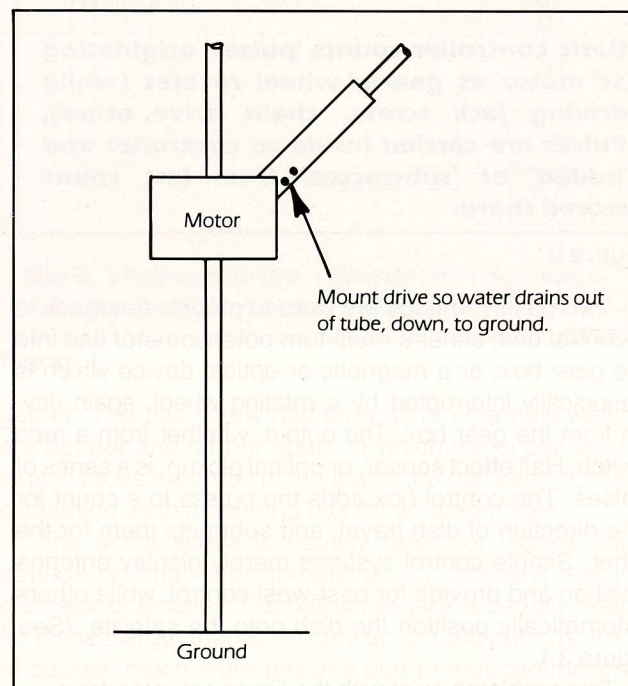


Figure 6

Mount the actuator with the drain holes facing down, on some units this is motor up, on some motor down. Try to use swivel rod ends at the attachment points, these will take up slight angular irregularities and insure longer life. Some linear actuators come with rubber bellows to keep out moisture and it is recommended that you grease the actuator tubes on units without bellows. (See Figure 7.)

If your dish requires you to mount your own bracket onto the reflector, mount it as far away from the center of the dish as possible to get the desired travel as this provides more strength. If the dish cannot be removed before a major windstorm, i.e., hurricane, assume that the support provided by the actuator is inadequate and tie down the dish from several points. While tornados cannot be predicted in advance, try to place dishes in sheltered areas in tornado-prone regions.

There is an art to adjusting chain tension in chain driven horizon to horizon mounts; too much tension is as bad as too little. Do use shielded cable in any pulse counting systems (optical, Hall effect, reed switch) and



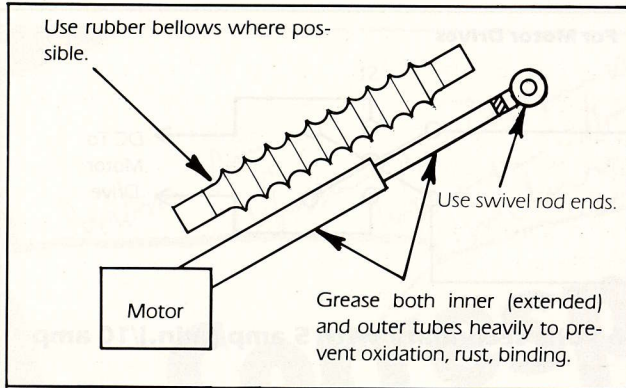


Figure 7

connect the shield to ground or controller case. This will reduce the chances of mis-positioning tremendously. Consider the use of crimp-on 'Butt splice' connectors for any splices that need to be made; if you don't have these, solder your connections. Corrosion in a twisted and taped splice has caused more than one service call.

If installing a controller which also can control polarity, and the receiver polarity interface (usually a SPDT relay) has horizontal and vertical outputs, determine if the receiver wakes up in normal or reversed format, and use the appropriate terminal to connect to the controller if it has even and odd indicators on it. The important thing here is not to have reversed format from the front of the receiver before programming the controller. (See Figure 8.)

Many controllers are set up for west coast operation, and the motor power wires need to be reversed if the actuator is mounted on the right hand side of the dish, as viewed from the rear, to have the east and west controls provide proper operation.

Actuator controllers are often microprocessor (computer) based, and while most manufacturers have taken great pains to protect their units from electrical power surges, additional protection, such as a plug-in-the-wall surge protector may be a good idea, especially in rural areas with above-ground power lines.

### Troubleshooting Motor Drive Systems

Pulse counting systems are usually designed to shut down motor power after a very brief period if no pulse signal is detected. This could be due to motor stalling, a break in cabling, or improper connections. If you are on a satellite and you attempt to operate the balky drive, and the signal changes slightly before the unit shuts down and indicates it is unhappy (motor error, blink, etc.) you know that power has gotten to the motor and that it is not stalled and there is a sensing problem. If the signal did not change at all, suspect motor cabling and the motor itself.

An ohmmeter is useful to check motor resistance, which should be quite low. Remember that limit switches are often in series with the motor, usually paralleled by diodes to allow travel in one direction, but not the other when the switch is open.

Hall effect sensors require three lines to operate; power (+5V), pulse (output) and ground. The same is true for most optical sensors. The reed switch will work with a two-wire hookup; pulse and ground. The power terminal, if supplied, is usually unconnected.

For old systems where the motor drive has failed, go directly to the motor housing first and check for water entry. Often signs can be seen without actually removing the motor retaining screws. Thirty-six Volt DC motors can be taken apart, the armature and commutator cleaned, the brushes replaced if necessary, but it IS a messy job if water has entered. The worst part of the job is trying to insert the commutator back in between the brushes. If you do not have a helper, an alligator clip can sometimes be used to hold a brush back against its spring while you wrestle with the other. The motor and gear housing can be removed from most

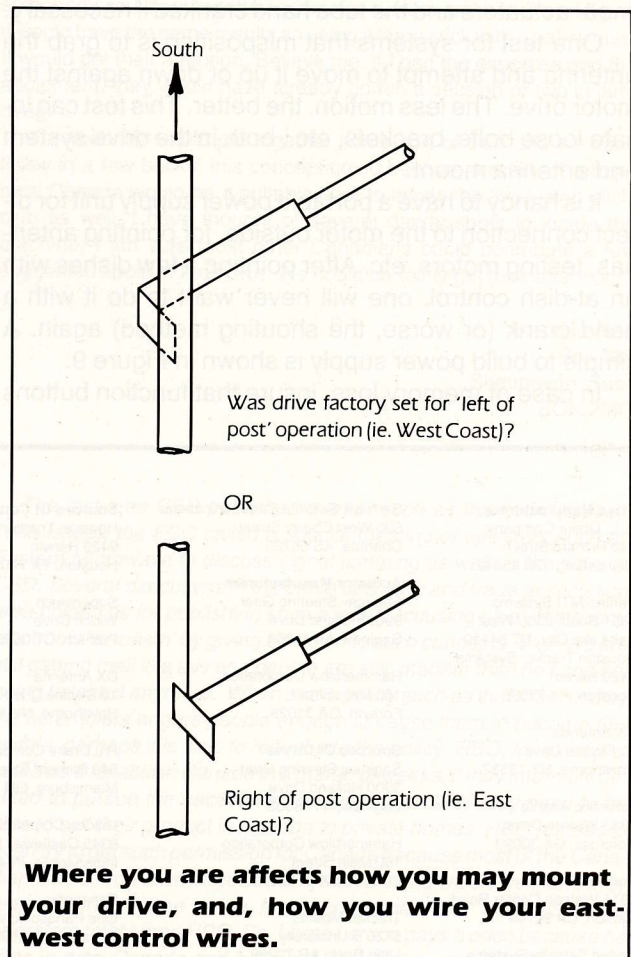
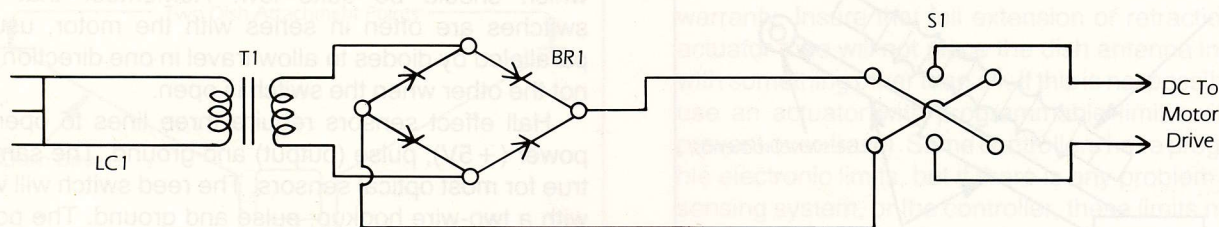


Figure 8



Portable At Dish Control For Motor Drives



**T1: Step-down transformer, 120 VAC Primary, 24-36 volts secondary with 5 amp (min.)/10 amp (max.) secondary.**

**Br1: Bridge rectifier, 50 PIV or more, 8 amps or more (Radio Shack 276-1184, or 276-1185).**

**S1: DPDT center off momentary contact toggle or breaker switch, 10 amps or more (Radio Shack 275-709, or 275-637).**

**Misc: LC1 (AC live cord; RS 278-1255); Plastic Box (RS 270-224); Strain Relief Grummets (RS 278-1636); Alligator Clips (RS 270-378, or 270-1545); 2 Conductor Wire.**

Figure 9

linear actuators and the tube hand cranked if necessary.

One test for systems that misposition is to grab the antenna and attempt to move it up or down against the motor drive. The less motion, the better. This test can locate loose bolts, brackets, etc., both in the drive system and antenna mount.

It is handy to have a portable power supply unit for direct connection to the motor outside, for pointing antennas, testing motors, etc. After pointing a few dishes with an at-dish control, one will never want to do it with a hand crank (or worse, the shouting method) again. A simple to build power supply is shown in Figure 9.

In case of memory loss, insure that function buttons

are not inadvertently being pressed which cause memory erasure. Second, some drives use a small battery inside to retain information in a RAM (Random Access Memory). This battery must be replaced periodically, usually once per year unless it is a rechargeable type. Some problems may also occur with the rechargeable battery, particularly if the unit has been on the shelf a long time. Other units possess a 'nonvolatile' memory that does not employ a battery. In this case, if one has ruled out power line surges, factory repair is in order. Memory retention time during power failure varies from unit to unit, so check the specifications if a unit will be without AC power for very long.

## Drive Manufacturers

R. L. Drake Company  
540 Richard Street  
Miamisburg, OH 45342

Pentec/MTI Systems  
2351 South 2300 West  
Salt Lake City, UT 84119  
Houston Tracker Systems  
9429 Harwin  
Houston, TX 77036

DX Antenna  
10 Skyline Drive  
Hawthorne, NY 10532

Scientific Atlanta  
6353 Warren Drive  
Norcross, GA 30093

Kenwood  
4315 Watson Center Road  
Carson, CA 90749

United Satellite Systems  
Highway One West  
Thief River Falls, MN 56701

Birdview Satellite Communications  
600 West Cherry Street  
Chanute, KS 66720

**Actuator Manufacturers**  
Saginaw Steering Gear  
3900 Holland Drive  
Saginaw, MI 48603

Hammerblow Corporation  
160 Main Street  
Forsyth, GA 31029

**Sources Of Drives**  
Saginaw Steering Gear  
3900 Holland Drive  
Saginaw, MI 48603

Hammerblow Corporation  
160 Main Street  
Forsyth, GA 31029

Tracker Mounts  
5720 S University  
Little Rock, AR 72209

**Sources Of Controllers**  
Houston Tracker Systems  
9429 Harwin  
Houston, TX 77036

Superwinch  
Winch Drive  
Putnam, CT 06260

DX Antenna  
10 Skyline Drive  
Hawthorne, NY 10532

R. L. Drake Company  
540 Richard Street  
Miamisburg, OH 45342

Uniden Corporation Of America  
6345 Castleway Court  
Indianapolis, IN 46250

Panasonic  
One Panasonic Way  
Secaucus, NJ 07094

Pentec/MTI Systems  
2351 South 2300 West  
Salt Lake City, UT 84119

**Sources Of Drives Plus Controller**  
Houston Tracker  
9429 Harwin  
Houston, TX 77036

Superwinch  
Winch Drive  
Putnam, CT 06260

Pentec/MTI Systems  
2351 South 2300 West  
Salt Lake City, UT 84119

**Sources Of Antennas With Integrated Drives And Controllers**  
Paradigm Mfg.  
3711 Meadowview Drive  
Redding, CA 96002

KLM  
PO Box 816  
Morgan Hill, CA 95037

Birdview Satellite Communications  
315 N. Lindenwood  
Olathe, KS 66062

**Sources Of Receivers With Integrated Drive Controllers**  
Scientific Atlanta  
6353 Warren Drive  
Norcross, GA 30093

United Satellite Systems  
Highway One West  
Thief River Falls, MN 56701

Kenwood Electronics  
1315 E Watson Center Road  
Carson, CA 90745



# Correspondence

### Hit The Target?

I think Coop missed the target in the February issue report on the 'Science of Scrambling.' The technical pitfalls of the descrambling process notwithstanding, for \$395 we can still buy it all! The thing we have to fake is the enabling pulse, frame sync, frame ID, and the data clock rate (does one suspect 3.58 MHz?). Then prior to the VideoCipher, inject the enabling pulse(s) at the proper time. Time is dependent upon the authorization number of the particular descrambler. You look up the number on a chart and set the appropriate timing switches on the authorizer, then sit back and watch. You don't suppose, do you, that it would be possible to force the input to the enable chip in the VideoCipher with a simple jumper?

Kenneth A. Johnson  
Johnson Ave.  
New Preston, CT

*There are two separate schools of thought on tackling the VideoCipher system head-on, as Coop comments in this issue. School one wants to force the VideoCipher to authorize even when it has not received the required authorization instructions in the downlink feed. This group of people is busy jumping pins on ICs, building enabling pulse generators, and generally trying to fool the VideoCipher. School two says 'the hell with the VideoCipher box; much of it is dedicated to special applications, such as on screen display and private message storage. To crack the system, you have to crack the cipher directly.' School one hopes that by fooling the box, you will have long term reception without authorization. School two says that you are unlikely to have long term authorization in a world of changing keys, unless you can simulate the keys themselves.*

### Jamming Okay In Canada

I have been a long term and faithful reader of Coop's Satellite Digest and I am totally 'browned off' with the present state of affairs as it relates to satellite scrambling and my ability to view a program as a result of their scrambling.

There may well be a reasonable case for compensation to be paid for the non-advertiser supported channels, represented in the most extreme case by HBO. However, I really object to their inflexibility and outrageous pricing. More than that, I object to their decision that precludes me from buying their service under any circumstance because I happen to live in Canada.

I live on a farm that is literally 40 miles from anywhere. There is no cable company anywhere near me. It would hurt no one if I was allowed to see their programming, or any of the other scrambled signals.

In spite of the fact that my viewing their programming takes no money out of anyone else's pocket, I would still be willing to pay a fair rate, such as the wholesale rate, to continue to receive their programs. By refusing to deal with me under any circumstances, I feel they are evoking people to respond in kind, to look for some 'tough way' to make them realize the error of their ways.

The concept mentioned in the January issue appeals to me. If somebody could put together a jammer system and turn it on, I figure it would have the same results as using a large stick with a balky mule. It would get their attention. Believe me, if I had the expertise and the equipment, they would have already gotten a session or two in jamming!

If somebody would put together some sort of club and we each threw in a few bucks, this concept could become a reality. Perhaps rural Canada would be a suitable spot to locate the 'walloping stick' club as well. I have thought of several dandy spots to locate the machine; I am sure most other Canadians could contribute a few suggested spots of their own. We could certainly get their attention!

Lorne Larson  
Box 338  
Shaunavon, Sask  
SON 2MO

*The last time CSD published a letter such as this (our October, 1985 issue), the FCC called a special meeting of uplinkers such as Eastern Microwave to discuss signal jamming as well as the letter in CSD. Several executives in the cable uplinking and trade association area chided us for publishing such a letter, accusing us of 'fomenting electronic terrorism' by giving attention to such concepts. Well, we are still getting mail like this and people are still 'madder than hell and not going to take it anymore.' When some policy such as that practiced by the scramblers angers people enough to cause them to become this hostile, perhaps it is time to reevaluate the policy. HBO, for example, could be available in Canada in a matter of weeks, if they internally decided to pursue the necessary licensing they claim they need to be able to sell their product in Canada to private homes. HBO refuses to even try to get such permission for Canada because most of the Canadian Cable firms own large cable systems in the US as well, and they fear angering these cable firms, concerned that their US cable operators might drop HBO. So, Lorne Larson pays a price because he lives in rural Canada and not rural US. Shaunavon is between Gull Lake and Climax on highway 37 in southwestern Saskatchewan; just north of Turner, Montana. You can't get much more rural than that.*



# PARADISE FOUND!



**PURCHASE AN AVCOM PSA-35 six-band spectrum analyzer from Satellite Video Services or AVCOM by June 14th and automatically qualify for seven days and nights at Treasure Beach, Providenciales, Turks & Caicos Islands this winter. AND, receive a \$100 value FREE BONUS spectrum analyzer video training tape. Details from any SVS outlet (\*) or AVCOM of Virginia, Inc. (1-800-446-2500). Orders must be placed by June 14th to qualify. Watch**



A man with dark hair, seen from the back, is lying on his stomach on a sandy beach. He is wearing a red one-piece swimsuit. To his right is the white hull of a sailboat, with a green inflatable tube or kayak resting against it. The background shows a clear blue sky and a distant shoreline.

**WIN A DREAM VACATION FOR TWO** in the Turks & Caicos Islands  
courtesy of AVCOM of Virginia, Inc. and Satellite Video Services.

**BORESIGHT** May 15, 22, 29 and June 5 (SPACENET TR17, 9PM Eastern) or **SPACE/Satellite Showtime** May 20, 27, June 3 and 10 (SPACENET TR17, 9PM Eastern) for additional details. (\*)  
Outlets in New York, Pennsylvania, New Hampshire, Rhode Island, Delaware, and Ohio; call  
1-800-528-DISH nationwide and 1-800-831-DISH from New York state.)

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ESPN  
THE TOTAL  
SPORTS NETWORK

CABLE NETWORK

THE NOSTALGIA  
CHANNEL

PLAYBOY  
Channel

THE DONEY CHA

# Transponder Watch

CNN

MTV

ABC

DISNEY

NASA investment in shuttle orbitors is approaching \$15B according to NASA testimony before Congress. One serious proposal floating would allow private industry to pay for a fifth shuttle bird and lease it back to NASA. After 15 years, the bird would belong to the ownership company as a private investment. Transfer of some NASA functions, such as operation of shuttle and marketing of payload space, to private enterprise is at root of discussion.

**EXPENDABLE** launch vehicles, the Ariane type rocket launchers now used by Europe, might take over significant part of the satellite launching load of the future, under private ownership rather than NASA. Proposal is part of reaction to loss of Challenger in January and concerns that continued operation of shuttle by government may not be in best interest of country.

**WARNING** that TVRO (home dish) industry 'will be dead within six months' comes from several US congressmen still fighting for passage of legislation to hold off scrambling and inject FCC as mediator in scrambling disputes. Cable operators have also been warned of 'possible antitrust actions' if they persist in pushing on TVRO's backdoor.

**INTELSAT** has decided to increase Ku-band spot beam power levels on new VI series satellites; first scheduled for launch in last quarter of 1987. Higher powers will make 3 and 4 foot dishes practical in many sections of Europe and North America.

**FORMAL** telecommunications agreement between People's Republic of China and USA being signed this month; potentially, US manufacturers of satellite hardware will now be able to participate in estimated telecommunications market as large as \$4B over the next six years.

**INTELSAT** is reducing the minimum antenna size requirements for their (very) large Class A and C earth stations. Previously, stations had to have antenna up to 32 meters in diameter for C-band and 18 meters in size at Ku-band. Under new approval, antennas as small as 15 meters at C-band and 11 meters at Ku-band will be approved for tying into Intelsat system.

**STAR WARS** Teleport, allowing direct multiple satellite access to C- and Ku-band birds, being built near Colorado Springs (CO) by private firm. The teleport will provide service to major 'Star Wars' research facilities located near Colorado Springs.

**NHK**, Japanese national network will be linked via Galaxy 2 with new Hughes Intelsat Grade B terminal near Fillmore, CA, starting October 1. Hughes will pick up NHK news bureau and other feeds from all over US, process at Fillmore, and transmit full-time to Japan using 24 hour per day satellite link from Intelsat.

**HR 4414** now in House would make it illegal to sell TVRO to consumer unless consumer has read and acknowledged special notice revealing that many satellite signals are scrambled and certain programs (such as CBS) are not available to home earth station users.

**EQUATORIAL** Communications shipping VSATs (very small earth terminals) to Australia for use with domestic Ku-band bird(s) there. Equatorial has been supplying virtually all sold C-band VSATs

in US for several years but previously had not displayed Ku-band system.

**ANALYSIS** of Soviet versus US communication satellites by Congress indicates Russians lag eight to ten years behind in state-of-the-art computers and satellite configurations. USSR has launched approximately four times as many satellites, but average current life span is 18 months versus 9 years for US satellites. Message capacity of US birds averages 10 times that of Soviets.

**IRISH** Communications satellite will be owned 80% by Hughes. Bird will sit at 31 west, have three spot beams into North America, Europe, and Ireland with five transponders of 100 watts and 24 with 15 watts. System is actually two separate satellites, one in DBS band (100 watts) and one in FSS band (15 watts). Cost of system estimated at \$400M (US).

**FARMERS** Insurance Group has installed number 1,000 of 3,000 expected Equatorial Communications C-band micro earth terminals. Company claims program, announced 13 months ago, is largest privately operated transmit/receive network in world.

**EUROPEAN** Space Agency (ESA) will have four rather than three dedicated satellites in service by 1987. ESA (ECS) 3 bird was lost in Ariane failure at launch in 1985; replacement (#4) will now launch in July while new 4th (#5) is scheduled for launch in first quarter of 1987. Three will be fully operational; fourth will be in-orbit spare initially.

**DEPARTMENT** of Justice has issued informational seeking subpoenas to wide range of participants in cable programming and scrambling, including two major cable trade associations. DOJ is investigating whether any US laws have been violated by scrambling to date.

**AUSTRALIA** planning next generation of satellites, for 1991 launch, at end of first seven year life span of initial satellite system. One twist in bid request; AUSSAT wants satellite 'delivered to them in geostationary orbit' rather than at launch pad, shifting responsibility for launch to satellite supplier. Most failures to date have been during launch phase.

**MIR**, February launched Soviet manned permanent space station, is expected to be receiving 'routine deliveries' from Earth with Soviet version of space shuttle by 1990 or sooner. Soviets plan to create very large full-time station in space for communications and other purposes. Earliest date expected for similar US station is 1994.

**KIDEO-TV**, a new broadcast station program block of first-run syndicated children's programming transmitted by Wold-TV, Mondays 10 AM-Noon and Wednesdays 1-3 PM on Westar 4, transponder 10. TV stations tape feeds, use for regular on-air release later in the week.

**PERCEPTIBLE** pressures for additional C-band transponders, beyond those now in use, is developing. Charges for 24 hour preemptive C-band transponders remain at all time low (\$50,000 per month) on birds such as F1R, but C-band transponder use now approaching 70% of capacity; highest ever. Loss of Challenger and shut-down of shuttle program expected to have adverse impact on transponder



availability by 1988 if not before, resulting in steadily increasing transponder prices by 1987.

**CABLE** operators largely do not want to be in TVRO sale and installation business, prefer to handle only programming sales and contract out at least installation to local firms, according to reports from NCTA.

**THREE** channel pay-per-view service for cable, delivered via Telstar satellite, planned by Telstar Corporation firm. Three different movies to be satellite delivered at any moment in time, allowing subscriber to select between the three for per-movie charge. Two channels will carry top films, third will carry less popular films. Fourth channel will carry end to end (looped) promos for films. Service on satellite link will be scrambled.

**COMPUTER** Distribution Network operating Galaxy 2, transponder 5, in mid-afternoon (eastern) time slot. Service is directed at computer stores and carries 'how to' use and programming information for computers and computer programming. Service is advertiser supported, unscrambled, with information from (312)490-6367.

**TRDS**, tracking and data satellite designed by and for NASA, moving to next generation. TRDS bird was lost in Challenger disaster leaving NASA with single bird in orbit and one on ground yet to be launched. Plan is to add three more as soon as possible, very similar to design of that now operating.

**IDB COMMUNICATIONS** planning a Ku-band voice/audio only portable uplink system for use in live sports and news coverage by end of the year. Firm provides sports interconnection service at C-band now, recently opened New York (Teleport) facility at Staten Island.

**SHOWTIME/THE MOVIE CHANNEL** pricing announced is lower by about 15% than comparative rates from HBO/Cinemax. Dish owners living within area served by existing Showtime affiliates will be sent to cable operator for service arrangement.

**CABLE SOUTHWEST**, Arkansas/Texas/Oklahoma cable operator, packaging 5 transponder service (CNN, VH-1, Nickelodeon, CNN Headline, and MTV) into \$6 monthly service and hopes to add ESPN, SPN, TNN, Lifetime, and WTBS for additional \$5 charge. HBO or Showtime are available for \$10 more with \$8 for second premium service (\$29 total for all listed).

**AT&T** will compete with Equatorial Communications in offering Ku-band VSAT systems. New AT&T packages using RCA Ku-2 bird, priced at around \$400 per month for one or two-way data and one-way voice under seven year contracts. Harris is supplying terminals for system.

**HI-NET**, Holiday Inns Ku-band system, now operational in more than 1,000 hotel locations with goal of 1,750 by end of 1986 and 3,000 ultimately when mature. Videoconferencing aspect has been reduced in price from earlier (C-band) offerings by 35% reflecting economies of scale with Ku-band network.

**COMTECH** Antenna Corporation is shipping new 3.5 meter Ku-band, Cassegrain fed antenna system for \$7,800 list. Antenna is rated for both transmit and receive. Transmit feed is extra.

**INMARSAT** 'test' of transmitting live television to ships at sea using Queen Elizabeth II liner for Super Bowl in January now mature; service is now available to Inmarsat terminal equipped ships at sea 'routinely' as part of new tariffed Inmarsat service.

**VIDEO FLY PAC**, system created by Conus Communications, now available. Seven or eight cases each weighing approximately 70 pounds (for scheduled air carrier shipping) contain everything needed

to have Ku-band video uplink in operation 20 minutes after opening cases with two men handling equipment.

**FCC CHAIRMAN** Mark Fowler, testifying before Congress, says he sees no reason for his agency to become involved in settling scrambling dispute nor in setting scrambling technology standards. SPACE Chairman Taylor Howard has been urging FCC to investigate scrambling technology and to establish national scrambling standards as way to bring pricing down on scrambling hardware. Fowler said, "I don't see any reason for the government to be intervening here."

**JAMAICAN** government demanding \$2,000 per TVRO in country as 'tax'; dish owners in country have created national association to fight demand.

**WESTERN UNION** now has completed conversion of Westar Satellite System 'network' from analog to digital capacity. New digital transmission system increases signal to noise ratios by 10 dB or more, reducing the noise floor of typical transmission system, making system far more desirable for high speed data transmission.

**GENSAT** Communications, having filed Canadian equivalent of 'Chapter 11,' back in business under new management program as GFA Communications. Gensat pioneered block distribution technology for 4 GHz receiver.

**HBO** in benevolent action unscrambled its feeds March 29th during 'Comic Relief' program designed to raise money for homeless. Unscrambled period lasted for three hours.

**EUROPEAN** study claims that none of the currently operating European satellite TV networks is breaking even and none will in foreseeable future. Report concludes that all video, voice, and data transponders in use in Europe by 1995 will generate no more than \$1.5B (US) per year in revenues, and \$900M (US) of that will come from non-video users.

**ASC** has opened a Ku-band transmit and receive facility for Phoenix; one of dozens of new Ku-band compatible transmit and receive terminals now being installed for the newest generation of satellites.

**CONFERENCE**, held via satellite under direction of North Carolina authorities, is investigating feasibility of various state governments acquiring their own transponders for use in both communication and informational areas. Long standing proposal would assign one satellite transponder to each state to allow states to 'reach outward' to potential tourists as well as to their inhabitants away from home.

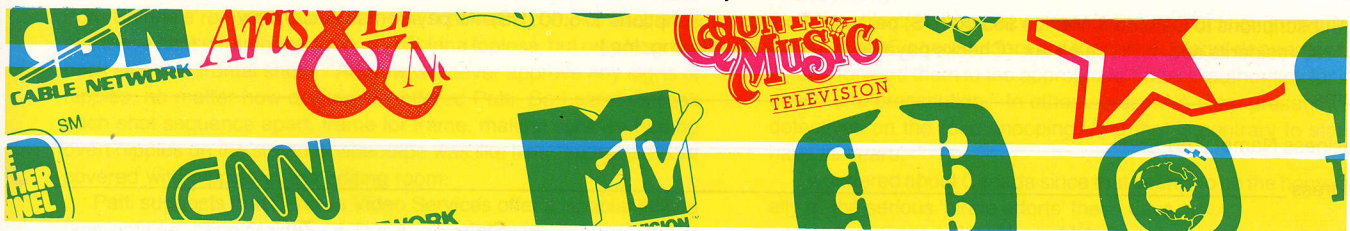
**OAK** Communications has closed down satellite TV product line engineering and marketing in Illinois and shipped to San Diego area Oak facility where cable TV products are headquartered.

**AC NIELSEN** says cable TV now reaches 46.8% or 40.4M US homes; an increase of 5% over one year ago.

**WESTERN UNION** may be saved by new plan to issue additional \$200M in debt securities, merging Western Union Telegraph with parent corporation, and restructuring debt for five year pay-out.

**INTELSAT**, worried about loss of Challenger, now plans to launch first two VI series birds on European Ariane bird in 1987 and 1988. A side benefit; by using Ariane, Intelsat VI birds can carry additional fuel and have 15 year nominal life rather than 9.

**BRITISH** ships and aircraft will be used in US 'Star Wars' research; test 'Teal Ruby' surveillance satellite to be launched this summer will seek out exhaust and other emissions from test 'vehicles' as part of system check out.





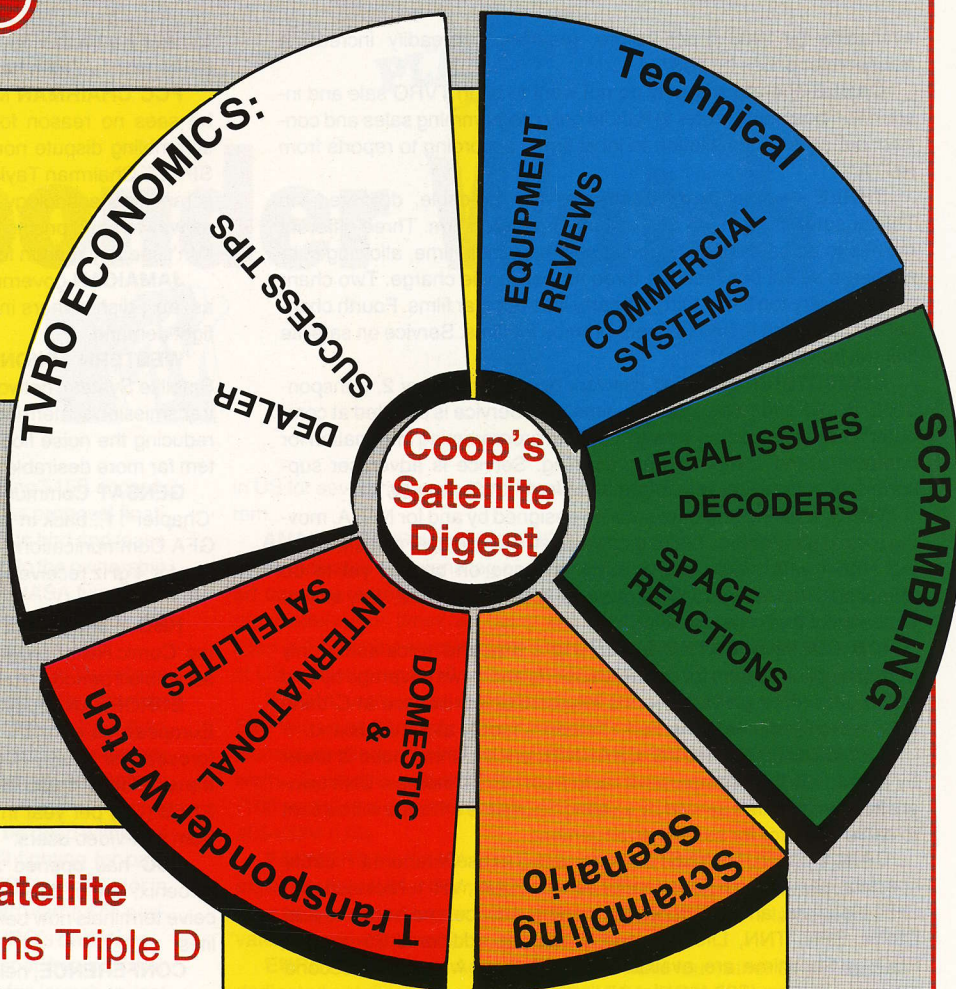
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Coop/continued from page 4

for Shirina the prior afternoon, and after Patti finished fitting it to Shirina's body, it was even smaller. "Suppose we shoot each scene several times; once with full bathing suits, once with Shirina topless, and then with no bathing suits?" My voice quivered perceptibly at the end. Several nudes from Club Med wandered by just as I was speaking. Nobody even noticed.

For the next three hours, we shot and re-shot Bill and Shirina from every possible angle; first clothed, then half unclothed, and then fully unclothed. A series of video recordings and then a series of still shots for the two-page spread display to be running this month in some of the trade press. Through most of this Patti ran her tiny 1/2" Camcorder unit and recorded for our amusement 'The Making Of An Avcom Commercial' while handling a couple of still cameras and running a professional camera as well. I played at being Director. Halfway through, I remembered Marshall Foiles' comment about 'not even noticing' that people were nude. He was right; I had been so busy making sure the cameras were running and the shots were coming off properly that I had totally forgotten to look at the two models closely. In fact, I would ultimately have to wait for nearly a day to study the videotapes before I would take a close look at either of them.

"I didn't notice that he has a ....," giggled Patti as we reviewed the tapes for the first time together. She was right, Bill did have a ....

The outdoor shooting done, the real work would begin—production of the commercial. When we finished, we had nearly 50 hours of my time plus almost as much of Patti's in the project. I told her that was because we didn't know what we were doing and it always takes longer to do something for the first time. My instincts told me that while shooting the models totally nude was great sport, those shots would never make it on the air. Even if Boresight and Satellite Showtime somehow agreed to accept the commercial, we knew that ultraconservative Andrew Hatfield would never allow his product to appear in the same place as two people who had their clothing removed. No matter how perfect the specimens of flesh might be.

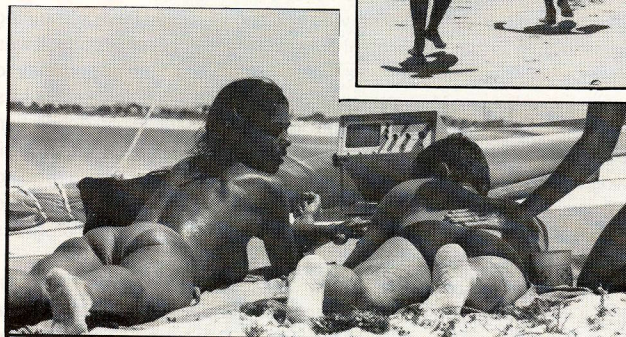
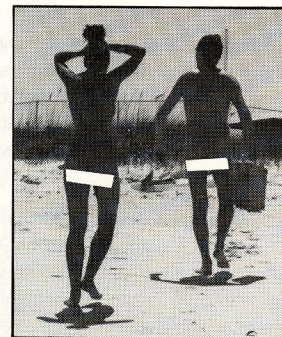
Still, it would be a shame and a waste not to use some of the video from Shirina's romp on the beach. We reached a compromise; we'd pull those shot sequences done with Shirina topless, but only from the back side. No frontal shots. "Andrew will never approve any signs of nipples, no matter how disguised," offered Patti. So I carefully took each shot sequence apart, frame for frame, making sure we had no overt nipples on the screen. If videotape was like film, I'd have a floor covered with nipples in the editing room.

Patti suggests that Satellite Video Services offer a 'special edition' tape entitled, "The Making Of The Avcom Commercial" using all of

♦ Avsac; guaranteed not to sink!

Models Bill and Shirina ♦  
leave the Caribbean.

Patti Cooper spreads salt water on Bill's  
back to make it glisten. ♦



those nipples and other parts which never made the tube on the Satellite Showtime and Boresight commercials. I must admit there is some beautiful video left untouched by the whirling tape-head and somebody ought to be able to enjoy it in addition to Patti and me. I'll have to talk with Gary Kistingner about that.

At one point as we were shooting, a topless lady from Club Med strolled into the action. She finally figured out we were doing television and stopped directly behind Shirina. There was a stark contrast between Shirina, our 'star,' and the poor soul from Club Med. I believe Marshall is right; those 650 new tenants at Club Med each week are often people desperate for human contact, at any price. Isn't it nice that we have our satellite television system to keep us company on those lonely, winter nights.

#### Inside Desug

Last month, we wrote that an effort has been mounted by Bob Richardson (Drawer 1065, Chaurauqua, New York 14722) to approach the breaking of the M/A-Com VideoCipher (DES) coding system from a purely academic direction. Richardson and a handful of dedicated people from various scientific disciplines are working on busting the code itself, a project that is quite different than busting the VideoCipher.

If you set out to bust the VideoCipher you are attempting to find switches that open and close within the unit. You want to cause the switches to open, or close, on your command and not on the command of the M/A-Com VideoCipher control center in La Jolla, California. Various techniques for doing this are reported (we touch on a few of the more humorous this month). I asked some people at M/A-Com what they are doing about those people who seem to be trying to get rich by offering techniques or equipment to do this. It might amuse you to know that GI has a full-time person, who's job is to scurry around the country locating people who are trying to peddle products that break the scrambling techniques used by GI/Jerrold on their cable TV converter/decoder units; M/A-Com has no such person working for them. I wonder why.

"We collect any reports we receive on products or firms offering to defeat VideoCipher and forward them to our legal department. They, in turn, forward them to the appropriate Federal authorities for investigation and prosecution." In other words, M/A-Com presently has no detectives on the road snooping. And that is contrary to stories we have all heard.

I wondered about Canada since that seems to be the home of virtually all the serious 'pirate efforts' these days.

"Aaaah, Canada," said one M/A-Com person, "a special situation



and a special set of circumstances. They, unfortunately, have no laws there that preclude firms from selling their books and boxes." So how would a firm selling in Canada be prosecuted? "Right now, only if they shipped or sold in the United States." Canada, occasionally called the 51st state, may get a sudden windfall boost in American dollars in circulation.

Meanwhile, the first formal meeting of the DES User Group, or Desug, took place in Dayton, Ohio, on April 26. On hand were various PHDs and other learned folks, who each hoped might have something to contribute to the challenge of breaking the VideoCipher code. It was an interesting meeting; people who would jump at the opportunity to walk into NSA in Maryland and 'borrow' the 16 Cray computers housed there long enough to tackle their VideoCipher decryption problem (two and one half hours was a popular estimate of how long it would take 16 Cray computers to 'break' VideoCipher) were rubbing elbows with ham radio operators who were just learning how to make Radio Shack computers percolate. Desug is making some progress as their regular bulletin reports.

The much discussed EPROM devices are a case in point. An EPROM is virtually defenseless against a copier. If, indeed, all of the VideoCipher switching secrets are locked up in a single EPROM (see other "Comments" here this month), most in the Desug group agreed that either M/A-Com had made a serious blunder in their planning or the VideoCipher design was 'locked up' too early, before some of the newer KEPROMs came along.

Many firms with lots of products have 'memory access' problems. Lots of products do not want unauthorized people to climb inside their EPROMs to discover how something is being operated. In the case of VideoCipher, the EPROM device holds highly classified operational 'keys.' In the case of other products, the operational sequencing of a product created by the product developers is 'hidden' there. But an EPROM can be 'read' quickly and easily by anyone with minor league talent. There is nothing very secure about an EPROM. Would M/A-Com gamble on the security of VideoCipher by selecting an EPROM for memory?

Prior to approximately mid-1984, there was no real choice in the matter. That was when a new device called a KEPROM came along from a firm called INTEL. The KEPROM is like an EPROM except that the KEPROM cannot be 'read' from the outside. Even 'slicing it apart' on a laboratory work bench will not reveal its secrets. The INTEL 27916 KEPROM is similar to a workhorse EPROM that has been around sometime, the 27128. 'First silicon' samples were available for the 27916 KEPROM in about May 1984. The first products were available in May of 1985; just about the last point where M/A-Com might have made a substitution and added the KEPROM in place of an EPROM.

Basically, the KEPROM is your 'tough character.' There is nothing known to man or science (at this point) that will make the KEPROM 'talk' or give up its secrets. It is a 'locked box' with no known way to read out what is inside once it has been secured. Those interested in learning more about the INTEL 27916 KEPROM will find data in the January/February 1986 issue of 'Solutions,' a house organ from INTEL and in the INTEL user bulletin 'AP-152.' Yet another reference of note is titled 'Using INTEL's 27916,' with a May 1985 publication date and running some 20 pages in length.

To complete your education on EPROMS and KEPROMS, they are both 28 pin devices and from all outward appearances look identical. Even playing around inside and poking wires will not outwardly indicate which a device might be. In a 'high security' operation, most manufacturers of such devices and most users routinely remove any part identification from the device or substitute a meaningless (to the outside world) internal house part number for something blatant such as 'Intel 27916.' So when you pry off the cover on a VideoCipher 2000 and paw around the ICs and other devices inside, you are not going to find roadsigns to help you determine the exact devices found there.

M/A-Com IS brighter than that.

### The Scrambling Channel

The last time I spent any appreciable amount of time talking with M/A-Com's Jim Bunker was in August. We talked about the flower business which he and his wife operate 'on the side,' the weather, and how M/A-Com should deal with the expected backlash from the TVRO industry. A suggestion I made was that M/A-Com spend some bucks and do some 'telecasting' of its own. I suggested a channel via satellite where M/A-Com could transmit the latest information regarding scrambling to the TVRO universe; both consumer and retailer.

I was pleased to see them launch 'The Scrambling Channel' early this past March. It operates on Westar 5, transponder 22, from 8 PM to 11 PM EST, seven days a week. The format is simple enough; a one hour videotape is run back-to-back to itself three times each evening. In that one tape you learn how a descrambler is installed, where to get one, and a little bit (but not much) about the status of scrambling these days. A long list of authorized distributors for VideoCipher also runs in case you're having trouble locating a VideoCipher 2000 descrambler. Everyone should watch the full hour at least once. And starting on May 1st, they began updating the one hour report every week or two with new material. That means you should try to watch it at least once and perhaps twice per month, or every couple of weeks, just to see what they have to say.

The original corporate plan was to run 'The Scrambling Channel' for 3 months, or until the first part of June. It has now been extended to run no less than six months, and as they approach mid-August, they will make a decision about continuing it beyond that point.

There are three basic costs associated with the operation of this channel; the transponder time (\$400 per hour), the uplink and tape processing time (\$200 per hour), and the production time for the basic material (it varies but should average no less than \$150 per hour). That means every three hour stint is costing M/A-Com around \$750 times three or \$2250 per day. In a month, that amounts to \$67,500 or so. Not small change.

M/A-Com would like to recover some of their costs here. If they apportioned \$10 per TVRO receiver sold in a month to this program by itself, they would have to be selling 6750 of their T1 receivers each month just to cover the program. No, they are not selling that many T1s this month.

So another possibility was to sell advertising to people and firms who would like to 'reach' the TVRO marketplace. The theory is that sooner or later most TVRO owners will stop by and watch 'The Scrambling Channel' at least one time. Wouldn't someone like to deliver a message to these people?

The answer turns out to be yes: HBO and Turner for example. A 30 second spot, appearing in each hour transmitted for a month, comes to \$17,055 for example. If M/A-Com could find four firms capable of paying that kind of fee per month, they could break even on 'The Scrambling Channel.'

It turns out, that if you check 'The Scrambling Channel' after you read this, you will see four (or perhaps more) different 'advertisers' on board. Does that mean they are breaking even? Not necessarily. There is some advertising swapping going on here.

Channel Guide, for example, is swapping time-on-the-air for 'space-in-print.' The in-print space is not for M/A-Com proper but rather for the promotion of 'The Scrambling Channel' itself; to encourage people to tune in.

This sort of 'cross promotion' will expand rapidly in our industry this year as various media disciplines discover how cost-effective it can be to exchange promotional space between themselves. The practice is as old as the first Ben Franklin printing press. (Ben reportedly sold or traded advertising display space on his 'kite' during the famous key experiment.)

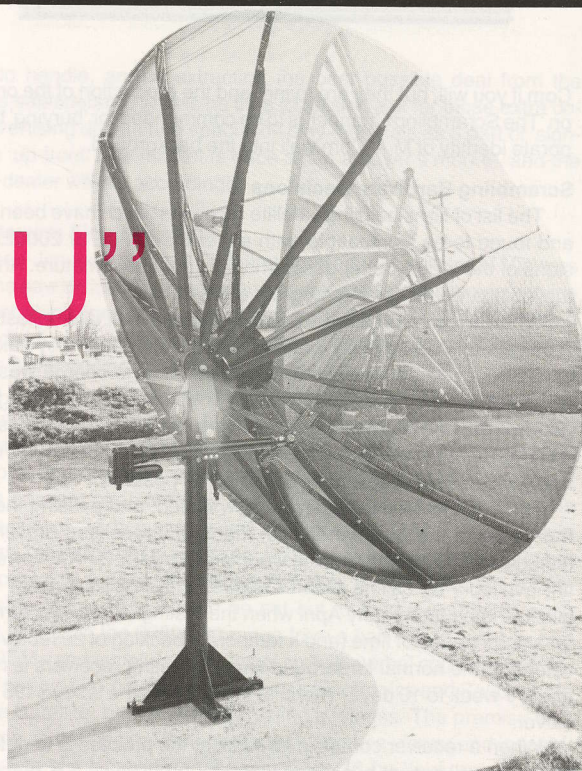
'The Scrambling Channel' to date would win no Emmy Awards, but as a source of important information it is a valuable service. Hate M/A-



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Com if you will, but they are trying, and the production of the one hour on 'The Scrambling Channel' is to be commended for 'burying' the corporate identity of M/A-Com well into the background.

### Scrambling Hardware Decisions

The list of firms building satellite receivers which have been tested and found to be 'compatible' with either the 2000E or 2000E/B versions of the VideoCipher descrambler is not about mature. And so is the 'no charge' for testing program at M/A-Com.

When, in early 1985, M/A-Com announced their offer to test TVRO receivers for compatibility with the VideoCipher unit, they said there would be a charge for each receiver tested. The charge was under \$500 at the time. Then they waived or discounted the charge as a goodwill gesture to get as many receivers into their labs as possible for testing. Right or wrong, it was in M/A-Com's best interest to have as many receivers 'VideoCipher Qualified' as possible.

The complete list of receivers now tested, and passing the tests, has reached the point where not many real receivers remain to be tested (see the complete list in Coop's SCRAMBLE FAX News Bulletin; available by calling (305/771-0505). Other than a minor testing glitch in late March/early April when the testing center was torn down for a short period of time (and a temporary backlog of 20 receivers developed), the normal turnaround time for testing receivers is running about 1 week to 10 days. There is now a fee for the tests, \$495 per receiver.

When a receiver comes in for testing, the process is to determine if the unit will accept baseband video for processing (i.e. be compatible with the 2000E/B unit.) Most do not, so the testing moves on to test the compatibility with the 70 MHz interface (VC-2000E version). Most units manage to meet this testing phase without a problem.

In the real world, that means that if you are building a receiver which provides a 70 MHz looped output for the IF, you will probably be compatible with the 70 MHz interface on the VC-2000E. If your receiver design uses some IF other than 70 MHz, or if you fail to bring out a 70 MHz IF loop to the back apron of the receiver to feed the VideoCipher, then the only remaining option is to try to make the receiver interface at 'baseband.' This is far tougher since the baseband interface requires a much higher degree of spectral purity of the demodulated waveform than many receivers routinely supply.

Thus, receivers with an IF in the 134 MHz region, or 510 MHz region (or wherever) have distinct problems. Either they somehow meet the tight specs for the baseband interface or they don't get descramblers.

Will M/A-Com be offering VideoCipher descramblers with different IFs; such as 134 MHz?

"No such plans at the present time," responds Doug Lindquist (619/457-2340), in charge of the program at the San Diego facility. Are there any 'field solutions' to this one? Perhaps.

One firm is offering to take your 134 MHz (or whatever 'oddball') IF output receiver and add on a box which will shift the IF to 70 MHz to allow interfacing with the VideoCipher E version. The concept is as follows:

The IF, not 70 MHz, can be 'shifted' or converted in an outboard or add-on mixer. Say we are on 134 MHz (center frequency) and we want to be on 70 MHz. How to do it? Build a mixer which has one port coming in from the 134 MHz IF source, another source coming from a local oscillator operating at 204 MHz, and the output port operating at 70 MHz ( $204 - 134 = 70$ ; with a few minor problems).

The add-on mixer could 'borrow' operating power from the receiver proper, and perhaps tuck inside of the receiver since the circuit board required would be very small. Total parts cost should be under \$10. Don't confuse that with the selling price or an installed price, however!

As you might suspect, M/A-Com cannot 'sanction' (as in approve) such outboard or add-on mixers at this point in time. There are too

many opportunities for a mixer designer to flub up in a situation like this and cause a long list of special problems. Still, the possibility for such a gadget is there.

Another approach now being taken by four manufacturers is to build a 'slot' or 'mainframe location' inside of the receiver where a VideoCipher module can be inserted. This approach was detailed in CSD for May and June of 1984 should you need to study it further.

The basic working guts of the VideoCipher are compressed into a smaller-than-VC2000 module. The module inserts into a set of 'rails' and plugs into the circuit. To do this you must negotiate a license with M/A-Com. The fee for the license is \$2,500 up-front and then \$.25 per receiver produced with the special slot in place. Standard Communications, Channel Masters, Birdview, and of course M/A-Com Consumer Group have such contracts.

Birdview announced in February an interesting marketing program; they were telling dealers that any Birdview receiver sold during the promotional period could be turned in for a brand-new Birdview receiver late this summer. The new receiver would be equipped with the slot for the (IRD) module. In effect, a consumer with a Birdview receiver would be able to upgrade to a receiver with the module in place for no direct charge (except for the module itself) later this year. Hummmm.

On the surface that sounds like a pretty good marketing ploy. If you can maintain a profit doing it. Below the surface, there may be some problems:

M/A-Com advises me that the module, when available late this summer, MUST (that's not a might; it is a MUST) be installed at the factory where the receiver is built.

That means, if you are a Birdview dealer, you cannot order in 10 receivers with the module slot and then expect to plug in those modules yourself. The receiver, to be upgraded with the module, must go back to the factory itself to have the module plugged in.

Birdview will be taking back a perhaps significant quantity of older style receivers that are not equipped with the module slot. Since the module itself is nearly as big as the present Birdview receiver, can Birdview rework those older receivers returned to make them newly compatible with the VideoCipher module?

Not at a low expense.

The dealer will have Birdview in an interesting spot. Your customer wants to upgrade, but he is not willing to hand you his existing receiver and be without satellite TV for several weeks while you and Birdview are screwing around shipping units back and forth in the UPS trucks. Either you, the dealer, provides a loaner while all of this is happening or Birdview simply lets you have two receivers (for each one out there) for a while until all of this sorts out.

I don't know about you, but I'd hate to have to try to maintain a profit structure at Birdview while all of this was going on.

Having to send the total receiver back to the manufacturer is a pain of course. M/A-Com says they are requiring this for a matter of security; they do not want stacks of modules sitting on dealer shelves all over America. Basically, they don't trust the dealers; it's that simple. I admit, I would be tempted to hoard a few myself.

So we will have all of these receivers crisscrossing the country; one way they will weigh significantly less than the other way (the module being your basic 'brick'). Maybe now would be a good time to buy some stock in UPS.

### And The Programmers

By now you have seen the 'clever' (Turner likes it) advertisement appearing on CNN and CNN-2. They are advising America that scrambling is coming and during this advertisement they actually do scramble for a few seconds. CNN is scheduled to begin full-time scrambling of both CNN and CNN-2 on July 1st. This will be your basic 'open-key' scrambling, which in Turner's case may well last longer than most programmers run open-key; say several months. That



means that if you have a VideoCipher authorized for any service (such as Showtime) it will automatically decode CNN and CNN-2 as well.

After CNN/CNN-2, what comes next? Well, there is a sizeable list of services including USA, ESPN, MTV, etc., who say they still plan to begin open-key scrambling before mid-September. In each case there is a significant number of VC-2 cable style descramblers to be bought, shipped, and installed. Frankly, if too many services try to scramble about the same time, the manufacturing capabilities at M/A-Com will be taxed beyond the point of delivery. They have been building 'to inventory/stock' for many months now but ESPN alone will eat up more than 10,000 descramblers in a short period of time.

The WOR/Eastern Microwave case is causing the other superstation carriers (for WPIX, KTVT, WTBS, and WGN) to back off a little for now. The feeling is that until some clear direction comes down from either a higher court or Congress as to how this is going to sort out, they are not anxious to invest time and money in scrambling. The positive side of this is that for now, at least, it appears as if the superstations (less WOR) will remain scramble-free.

The industry's slow, but consistent recovery through much of April was the primary bright spot in an otherwise drab spring. The depth of the 'recession' can be measured in real terms by comparing some of the sales figures for the major OEMs in the industry. STS of Missouri, for example, shipped 143,000 satellite receivers during 1985 (calendar year). The sales for the three month quarter running July to September was just over \$30M. Sales for the three month quarter ending March 31st was \$5M. That's more than an 80 percent drop in three quarters and that has to hurt.

In trying to figure out what the real OEM level shipments may be for the most recent complete month, one has to carefully consider the amount of inventory in the pipeline at the same time. That is almost impossible to measure, accurately. Some firms, such as Spacevision, held special one day 'dump' sales, for example, at the close of the month, offering 65 degree LNAs for \$40 each in distributor quantities. That helped clear out some inventory and in some cases such as this (but perhaps not specifically Spacevision), a banker may have put pressure on the firms to force them to unload some inventory before a banking month or quarter closed.

Here's a number, nonetheless; between 5,000 and 10,000 complete systems appear to have been shipped from the OEMs during March. It is impossible to be any closer than that range since there are often conflicting numbers even from within the same company. Many OEMs who are able to ship on credit terms are not sure one can really count systems shipped on credit, in today's TVRO economy, as 'systems sold' in the month shipped. Distributors for Uniden, for example, may still have merchandise in stock which they acquired six or more months ago on credit and which is still not paid for. Was that equipment 'sold' six months ago, or will it be sold when it is eventually paid for? Old debts do not pay off current bills unless they are collected currently of course.

Different parts of the country seem to be doing different things with different receiver products. The STS line, for example, seems to be doing particularly well in the mid-west and southeast, while the M/A-Com and Chaparral units are doing well in the northeast and upper Great Lakes states. At SVS, Uniden continued to be the best seller (the composite of four different models while Chaparral, for example, has but one) through March by the percentage of sales for other brands carried was cutting rapidly into the Uniden lead.

Marketing efforts have been particularly scarce through the spring, and a number of firms are gearing up for a 'marketing reentry' over the next few weeks. The major OEMs will be concentrating on awarding 'exclusive dealerships' to qualified dealers, and the really qualified dealer should find himself being 'courted' by several OEMs at the same time. The dealer with an established track record and store front business that has weathered the worst of the current recession will be able to take his time in making a firm decision on which line or

lines to handle, and in extracting the best possible deal from the OEM's salesperson. This is no time to be shy; ask for those extra co-op advertising dollars and special display materials as a part of 'signing on' up-front. The market is once again a buyer's market, and the bright dealer will act accordingly.

## The Viewers First Squabble

When Jim Rothbarth of STS first created the concept of Viewers First, he saw an industry owned and operated premium movie service channel which operated as a nonprofit corporation. Rothbarth pitched that individual receiver OEMs, to insure that there would continue to be a receiver business for years to come, should be smart enough to realize that unless there was free or reasonably priced 'software' (i.e. programming) available to TVRO dish owners, there would be no hardware business. In the summer of 1984, Rothbarth tried to sell that concept to approximately a dozen receiver OEMs. He had few takers.

The concept of an industry owned and operated premium movie service did not die, however. It was picked up by SPACE's Rick Brown who saw the program in a different light; an industry service, yes, but not necessarily a nonprofit industry service. Brown opted for private ownership of the service, and he set out to fund it with initial seed money checks in the \$250,000 range from a half dozen receiver and other OEMs and suppliers. The initial six with verbal commitments included people like Jimmy Long of Long's Electronics and Sandy Wirth of Delta Satellite; both in the distributing business. The premise was the same as the original Rothbarth plan; create a viewer and industry friendly premium movie service which would be 'fairly priced.' Undoubtedly, people such as Long saw the same wisdom as Rothbarth; without attractive 'software,' the hardware we all love to sell was useless.

As the Viewers First program dragged on, however, some of the players had to fold. People like Bob Dushane (Janeil) simply ran out of bucks and could not stay at the high stakes table. The number of backers gradually thinned down so that as we write this there may be three of the original six still in there. Each time a player drops out, the next call for seed money from the players causes those still remaining to dig even deeper into their socks to find the loot to keep the project moving ahead.

Originally, Viewers First was not going to scramble. Then very shortly thereafter it said it would scramble but not soon and not with any of the then-known scrambling systems. More recently, it said that by May of this year (that's this month) they would announce a scrambling system format. Normally, that would have been a forgone conclusion; what system, other than VideoCipher, could any service really consider given the domination of the VideoCipher marketing to date?

But Viewers First had selected something called SelectTV as its program connection and this full-time (Telstar transmitted) programming to SMATV has ownership ties to a Japanese firm called Clarion. Clarion is in the business of manufacturing cable television converters and descramblers. In other words, Clarion has its own scrambling system design and if SelectTV has ties to a supplier such as this, was there not at least a possibility that a Clarion system would be used for scrambling of the Viewers First Network (VFN) service?

Alas, after much debate in the trade press, the answer would turn out to be an emphatic no; Clarion was never really in the running for a contract to provide scrambling to VFN.

Complicating the VFN choice however was another element; the principals in VFN were the very people who, from the hallowed halls of SPACE, were most vocal against the likes of HBO and M/A-Com. Leading the VFN team is none other than Richard L. Brown, who as General Counsel of SPACE, spends most of his working hours bad-mouthing the present scramblers and scrambling systems. How could the same people who are attacking M/A-Com and HBO make a decision selecting M/A-Com's VideoCipher system for their own scrambling?

Alas, again.



There are some principles here; that's 'principles' as in fundamental truths. Rothbarth, one of the trio still hanging in there as the VFN membership dwindled, reached his 'limits' on the question of signing with the M/A-Com's VideoCipher package.

"Remember, I wanted to do it as a nonprofit plan to begin with. I had no ulterior motives except to insure that we did this thing (offering of a premium, scrambled channel) cheaply enough that the cost of the descrambler and the software (programming) would not get in the way of the real business we are all in here; selling home TVRO systems."

Rothbarth felt that at \$400 consumer cost per descrambler, there was just too much additional cost for the consumer.

"Plus, the programming costs are too high. I expect them to come down, but not that much. These programmers have to protect their first line customers (the cable systems) and they will never come down enough to give the cable operators any competition from TVRO users and sellers. If we are going to drop the price of premium programming, we will have to do it by starting off with a non-cable-friendly service." To Rothbarth, that meant SelectTV.

"I wanted to buy them, first. Look, they weren't doing very much. They only have a small distribution universe in SMATV and none in real cable. They have a good movie selection but poor distribution. So I said, 'Let's buy SelectTV!'"

Rothbarth had priced the cost of a suitable descrambler in the \$50 region for a stand-alone unit or \$30 if the descrambler was built into a receiver. He calculated the programming firm could afford to operate by selling individual home TVROs for \$5 per month. Comparable numbers with M/A-Com and HBO are \$400 and \$12.95.

Well, somehow the purposes of Viewers First got convoluted and as the service wound closer and closer to their own May deadline to announce a scrambling service, Rothbarth found himself more and more at odds with the way the company was going.

"I told Brown that if he signed a deal with M/A-Com for VideoCipher, he just lost another player in the company. I hoped that might turn him around on this."

Brown reportedly countered that a stand-alone scrambling system, perhaps not as secure as say VideoCipher has proven to be, would stand little chance in the marketplace. He also wanted to be able to put Viewers First into the package programming business offering additional services such as MTV.

Rothbarth says he responded, "MTV is nice, so is CNN. But there is only one type of service that is absolutely essential; a movie service. Everything else is frosting on the cake. Don't burn the cake with too high prices."

So the Viewers First Network, starting out as a concept to insure that the industry did not awaken one day and find all of the movie services gone or priced out of reach, has essentially become another of the overpriced services. Many of the original participants have now left the group and those remaining have the ticklish job of explaining that they are indeed TVRO friendly in a world that is increasingly less and less friendly to TVRO. It will be interesting to see how it all turns out.

### Technology Slow-Down

Editing a publication such as CSD can be a very pleasant profession since we seem to be working as often as not on the very leading edge of an exciting, rapidly developing technology. I am forced to 'learn' or understand a new concept or problem when I find myself trying to write about KEPROM devices for example. I never heard of a KEPROM until I set out to research a brief 'comment' in this month's issue dealing with reprogramming EPROMS. I was under the mistaken belief that an EPROM was an EPROM. I learned something.

In this issue is part two of a scheduled four part series created by Jim Vines. Jim is writing about TVRO antennas, how they are designed, why they work, and more importantly why they sometimes do not work as well as the builder had hoped. Jim is uniquely qualified for

such an assignment because he began designing and trying to better understand TVRO antennas in 1977. Jim didn't have fantastic success in the commercial TVRO antenna world, like say Randall Odom, but his total and complete understanding of why antennas work (and don't work) makes him one of the brighter TVRO-land antenna people around.

We assigned this writing project to Jim nearly one year ago. He completed it more than 8 months ago and we have been sitting on it hoping to use it, intact as a single piece, in our now much forgotten TVRO Handbook. The rapid deterioration of the industry caused us to postpone 'the Handbook' and that's when Jim's 90 page manuscript with dozens of drawings went into a file cabinet.

Working over Jim's material for print is no chore; he writes well, uses fun words and usually doesn't wander off the beaten subject. His only fault is that he often tries to 'sell' the same or nearly same article to a half dozen different magazines at the same time! Nobody's perfect.

While polishing this month's Vines-piece, I found myself remembering that we are all in a fairly high tech business where virtually everything we attempt to do could not have been done 'yesterday.' For yesterday, it would have been impossible. I cannot recall how many months or even years it has been since I had similar thoughts. Today, when I pick up the telephone it is to listen to somebody complaining about how they are barely surviving, or not surviving; how the latest round of HBO incited advertisements in their area is further quashing business, or some such negative message. Some days I truly regret Alexander G. Bell invented the telephone. Gosh, where did the fun that typified this industry once, go???

Vines also reminded me that we have a significant number of unresolved technical problems out there. The 2-degree spacing issue, in spite of great statements to the contrary by Taylor Howard, is not resolved. I can 'see' degrading noise on SPACENET or ASC or F3R every time I run a dish over to the western sky. The noise is coming from one or more adjacent satellites. Taylor seems convinced somebody is going to create a wonderful receiver that simply ignores the RF products from these adjacent satellites.

Well, not soon. And not because it is impossible forever but because everyone of us is so busy trying to stay alive, make payroll, and battle with the banker that we have very little energy and even less time remaining at the end of the day to think about solving some of our technical problems. And if a project such as 2 degree spacing requires money as well as time, well.... maybe it is impossible.

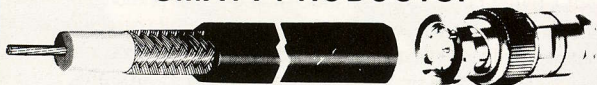
So perhaps the biggest loser in the midst of all of this turmoil that typifies today's industry is ourselves; for the first time since we started TVRO, we are standing still in technology. And in an industry like this, if you cannot or do not innovate, you are not standing still, you are actually going backwards. All around us new microwave devices are being developed for other industries. Some of these devices would make life better for us in TVRO. But lacking the funds to explore these possibilities, we find ourselves standing still or even being pushed backwards.

I dislike having to devote page after page to the subject of HBO and scrambling and the latest M/A-Com foible. It is not productive. But it is unfortunately uppermost on our minds because these are the events which are pushing us closer and closer to the brink of extinction. We cannot ignore them; they will not simply go away on their own. We must face them, squarely, and do what we can to change their course. Alas, in the meantime our technology seems frozen and our ability to cope with the necessary advances in technology to keep us alive as an industry is more and more difficult to organize.

For now, it is a bad news/good news scenario. The bad news is that we have very little new technology to dissect. The good news is that most of us are still here to dream of the day when we once again will be able to train our full attention on the challenges of the true TVRO industry.



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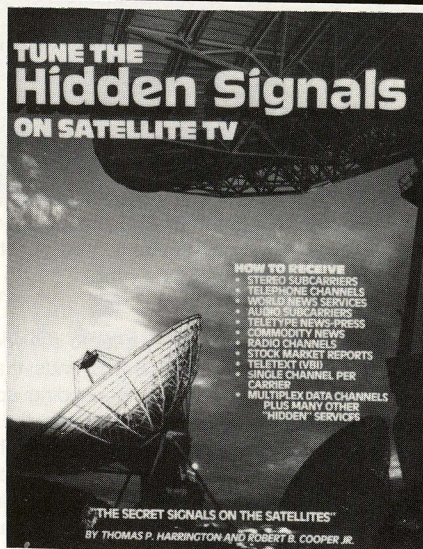
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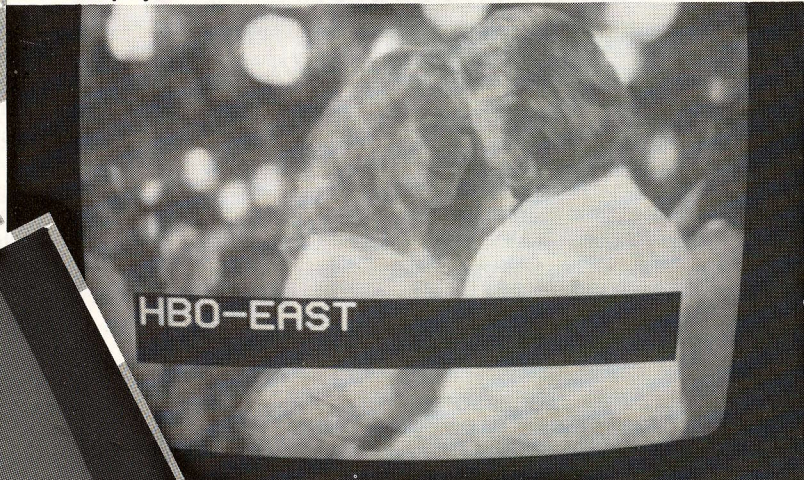
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WOR gets you no entry; just on screen display that says 'No subscription.' Other superstation common carriers appear to be waiting this one out, to see what guidance is coming from high courts or Congress before they move into closed key scrambling.

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Cross promotion/ HBO in their text service on Galaxy 1 and F3R provides promotion for tuning in 'The Scrambling Channel' over on Westar 5. You get this text by entering the correct commands into your VideoCipher unit.

One of the more popular stories around these days concerning breaking the M/A-Com scrambling monopoly suggests that M/A-Com will pay a \$100,000 'bounty' to anyone who can lead them to an unauthorized version of the VideoCipher descrambler which works; that is, decodes both audio and video. That turns everyone into a 'snitch' of course, and the Russians and Nazis used a similar ploy to get 'insider information' about dissidents.

So here is my public report on the latest plays out there in video-land. M/A-Com can send me my check directly to Barclay's Bank in the islands.

Westar Communications in Toronto (800/265-5675) claims to

have broken the VideoCipher cipher-codes. They offer to sell you a Canadian built version of the VideoCipher for \$500 (US funds, thank you!). Unfortunately, their delivery is quite slow; depending upon whom you talk with, they speak about delays from 6 to 18 months.

This one amuses me. Several people who have called say they have seen this unit work. One person saw it operating at a hotel in Montreal while another saw it working at a hotel in Tampa. The firm, when you call their 800 number, pointedly says they will not sell to anyone inside the United States. They explain that their legal position is that since the American satellite signals cannot be sold in Canada (i.e. HBO has no legal rights in Canada), it cannot be illegal to sell unauthorized decoders there.



They said that as of mid-April their production capacity was no more than 50 units per week. I can picture somebody buying 50 VC-2000 descramblers, built by M/A-Com, per week and hauling them back to Canada to stuff them into new cases so they don't look like VC-2000s. I can picture these same people getting the units authorized and then selling them with the representation that the 'new' units require no authorization. I've no way of knowing how Westar Communications is handling their product, but the possibility that inside of their units one will find a VC-2000 board seems high to me.

Late in April, Westar Communications was planning to go through a significant operational change; new management, new owners, and a new and much higher visibility. By the time you read this, they will either be long gone or they will be the hottest news item in the business.

Oh yes, when they refused to sell me a unit for \$500 (I offered to come to Canada to pick it up), they did offer to sell me a book for around \$25. The book, they said, would be shipped to me COD in the states and it would tell me all I needed to know about descrambling HBO. I ordered the book of course.

The well publicized "Black Box Solution," sold out of Arkansas for just under \$50, is another interesting study in books. I understand they have been averaging between 300 and 400 copies sold per week for several months now. For those short on calculator power, that works out to \$86,000 per month at the 400 per week level. These guys could gross a quarter mil before their train runs out of steam.

The amusing part for this one is that their \$50 book bears a striking resemblance to another book that sells for \$19 from SCRAMCO (8688 Royal Drive, Noblesville, IN 46060). SCRAMCO is an established company that has been catering to 'pirate TV gadgets' and plans for several years. I am not passing judgement on how they make their money, but I must be amused when one of their books (available now

for sometime) ends up being pirated (down to copying the typographical errors!) and resold for two and a half times the price. Only in America.

If you are not amused by the antics of Westar or The Black Box Solution, try this one on for size.

For several months there have been stories about some outfit (first in Phoenix, later in Missouri) which would send you a very special 'EPROM' device. The story was that the EPROM had been 'copied' from a master EPROM which was inside of an authorized VC-2000 descrambler. In other words, somebody bought a VC-2000, paid the fee, had it authorized, and then (they claim) figured out how to get inside the IC device that contains the special memory and authorization information for that one unit. Then, the story goes, they figured out how to copy that internal memory in the EPROM and transfer it into a new 'blank EPROM.' Now they are turning out forged copies of the EPROM and sending them to you for a fee. As long as they continue to pay for the original unit's subscription fee, your forged copy will produce decoded HBO. That's the story.

A trustworthy person I know has one of these EPROMs. He says it works. He paid \$70 for it, and if all this were true, after three to four months of using such a gadget, you would be money ahead from the normal HBO subscription fees. If all of this were true.

Some people at M/A-Com deny that such a trick will work. So how might somebody make you think such a trick did work? Well, they could buy VC-2000s and have both authorized. Then, they could unplug the EPROM from one and hand it to you. Sure enough, when you plugged it in, it would work as if it were authorized to work, because in truth...it was authorized. All you know is (1) that it works, and (2) that you had been told it was a forged copy from EPROM. You might have a difficult time finding out whether it was really a forged copy as represented. Why would somebody buy a \$365 VC-2000 just to disable it

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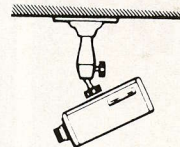
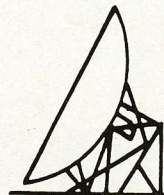
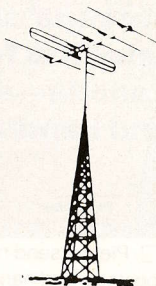
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by taking out one EPROM, and then resell the EPROM for \$70? Sounds like a good way to go out of business to me! You would only do a few this way of course; showing them only to the 'right people' whom you hoped to con into investing in your EPROM rewrite scheme. Once you had the investor's money, off you go into the Canadian countryside.

Now, suppose M/A-Com is wrong; that this can be done. Won't that present a problem to M/A-Com security? Maybe.

If you could take a three dollar IC and program it to decode HBO and sell it for \$70, you'd have an interesting market out there. And some potentially nice profits. Even after the legal fees. Now, let's say you wanted to sell 100 of those per month. This will require some sort of marketing scheme; there is no way you can individually qualify every potential customer for your \$70 EPROM. Sooner or later, one of your EPROMs is going to end up in the hands of a M/A-Com person.

Remember that you made this work by copying information out of an EPROM into a blank EPROM; sort of like making a cassette dub on your audio tape decks. In the hands of M/A-Com, the EPROM would be read, and out of it would spew all of the control and ID numbers from the original unit you copied from. Sixty seconds later, the M/A-Com uplink control center in La Jolla, California, would turn off that unit. Every other unit that had that same control/ID number would turn off also.

This might turn out to be the ultimate self-renewing business. Every time M/A-Com got their hands on a chip, they would turn off all the units sharing that ID number. All of your customers then have to buy a new or replacement EPROM from you, using another (backup) ID number. Heck, I might even be tempted to send Jim Bunker at M/A-Com one of the chips every 90 days or so just to be sure that my customers had to return to me at regular intervals for a new chip! Science is wonderful.

If replacing your EPROM is still not your cup of tea, there is the al-

ternate Canadian scheme that allows you to keep your original EPROM. But this plan has you clipping into several pins on that EPROM with some clip-on devices, and then running the wires attached to the clip-on devices to a special circuit board that this (Canadian) firm will sell to you. Here's how this one works:

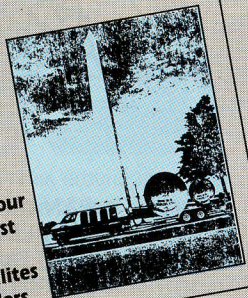
- 1) Their circuit board is supposed to allow your unit to be authorized by remote control. The normal 'remote control' exercised by M/A-Com through the downlink control network is replaced with a telephone line connection.
- 2) Your add-on circuit board extracts the scrambled video and audio out of the fabled EPROM and holds it for safe keeping within the circuit board. Now, the control signals which actually authorize the descrambler to descramble the video and audio are ignored in the satellite feed. Your add-on circuit board is connected, by you, through a telephone modem (coupler) to your house phone and you dial an 800 number. The other end of the 800 number has a computer connected to it and the computer 'talks' with your add-on circuit board.
- 3) When the conversation is over, your add-on circuit board is now authorized to tell the EPROM to decode the audio and video on HBO.
- 4) The creators of this scheme claim that the system works as long as HBO does not change their 'master key' signal. They claim they are intercepting that signal from an authorized unit, storing that information, and then forwarding it via telephone line to your add-on circuit board on command. If the HBO master key is changed, you have to redial the 800 number and get a new authorization for your unit.

There are more schemes out there of course. Two interesting threads run through most of these. First, most of the activity is in Canada. There is a strong belief among many in Canada that as long as HBO and the others refuse to sell within Canada, because they

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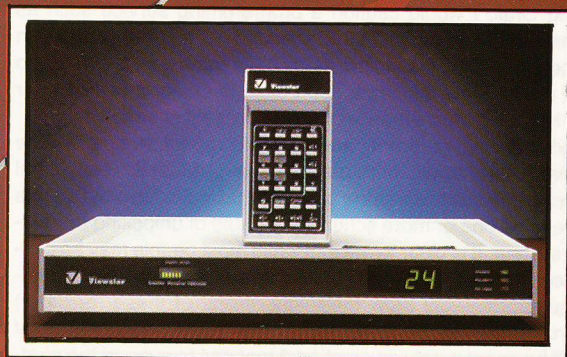
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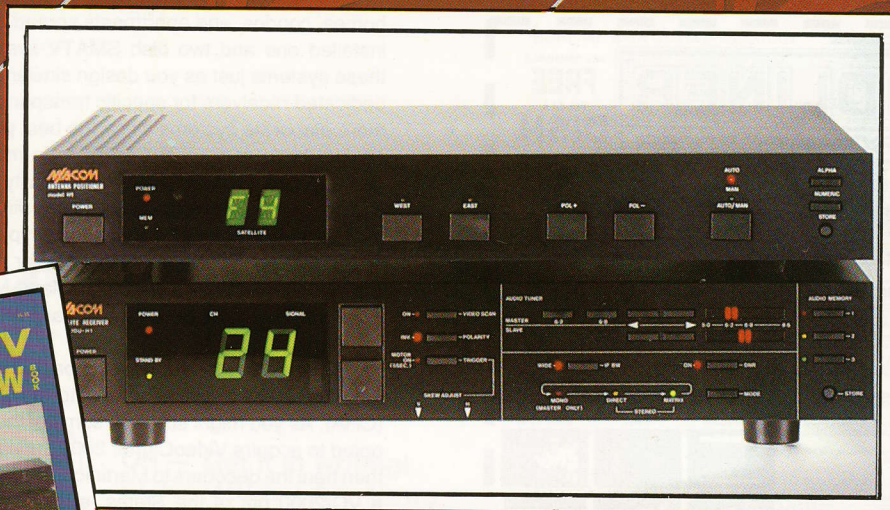


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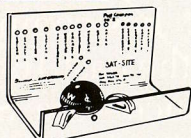
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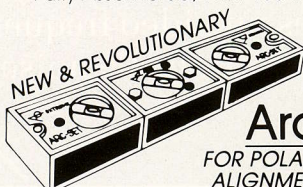


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have no resale programming rights for Canada, it cannot be illegal to pirate the HBO signals in Canada. I'm sure somebody will try to test that in a Canadian court one day soon. In the meantime, many American greenback dollars are crossing the border in search of the Holy Scrambling Grail. I would caution a programming service such as HBO planning to rush into court in Canada to get a contrary decision that in recent years the Canadian courts have been very unfriendly to American media firms. Losing a court case in Canada could be far worse for HBO's interests than leaving the present situation alone.

Second, I am amazed how many people repeat stories like the ones I have related to you here as if they were the absolute, gospel truth. There continues to be a strong feeling that indicates most people want there to be one or more schemes capable of unlocking the VideoCipher system. It is clear to me that while most people may be basically honest, they feel HBO and M/A-Com have coming to them whatever ill the winds might blow their way. If any of these (or other) schemes ultimately do work, no matter how briefly, a great deal of money will be spent purely on emotional reasons to support the pirating scheme. M/A-Com and HBO continue to have one of the most perplexing 'PR Problems' in the history of American business. I wish them well in sorting it all out.

## Caribbean Hotel Problems

Down in Jamaica, that island south of eastern Cuba, more than 300 private satellite dish owners have banded together to form a national association of Jamaican dish owners. They apparently represent about 10% of the dish owners in Jamaica. They are up in arms because the Jamaican government, after encouraging the free use of satellite TV signals and also encouraging local industry to manufacture dishes and other parts, now proposes to charge \$2,000 per dish as a 'license' fee.

That sounds like a serious problem, but it barely scratches the surface of what is happening all over the Caribbean these days. The focus of the new problem is the hotels and condos which dot the beaches from Barbados to Nassau.

Over the past three to four years, thousands of hotels, guest homes, condos, and apartments spread all over the Caribbean have installed one and two dish SMATV systems. They have designed these systems just as you design similar systems here in the States; dedicated receivers for specific transponders, multiple dishes for the more elaborate systems since the best programming is spread over several birds, individual CATV grade modulators for each channel carried, and professional cable quality distribution systems with aluminum jacketed hardline and in-line directional couplers and taps.

The choice of programming for a typical installation like this has been HBO (or Showtime), Cinemax (or The Movie Channel), CNN, ESPN, WTBS (or WGN), and perhaps MTV (or VH-1). Several of these services are now scrambled and all of the remainder claim they will scramble shortly.

The total number of TV sets impacted by this is considerable; more than 200,000 TV sets according to the Caribbean Hotel Association (CHA). As you might suspect, some of these hotels and condos have opted to acquire VideoCipher 2000 series decoders in the states and then haul the decoders to Martinique or Barbados or Cayman. Hauling a VC-2000 out of the States, even to Canada, is both illegal and against HBO policy of course. You will remember that HBO has not purchased the viewing rights for its films outside of the US; even Puerto Rico presents special problems to HBO. So they cannot resell what they do not own.

Even if the CHA is high by 50%, and there are 'only' 100,000 hotel, apartment, and condo units involved, the dollars here are significant. For HBO, and, for the hotels that bought and paid for SMATV systems some years back. If you follow US costing, there is around \$130 per TV outlet invested here on the average or \$13,000,000-up for the equipment. If HBO could somehow collect \$5 (US) per outlet per month, they would be \$6,000,000 better off per year.

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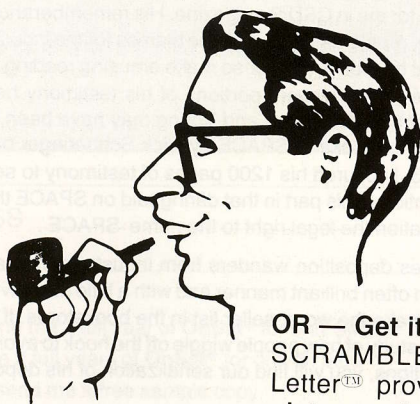
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At least one US program supplier, WTBS, is interested in those numbers. I talked with an exec at WTBS about this problem (he called me), and he acted as if there might be some way for at least WTBS to work out a resale program that would cater to these forgotten people. With Turner going into the oldie-but-goodie movie channel business, I suppose it is possible, since he owns all of his own movie product, that he could give himself the permission he needs to resell in the Caribbean; something HBO does not seem anxious to pursue on their own for their flicks. With Turner able to offer a movie channel, a news channel (CNN or CNN-2), and a general interest channel (WTBS), there is a package there which could ultimately prove very important in off-shore areas.

For now, tens of thousands of units served by satellite television in the Caribbean and near-Central America are scrambling for some way to descramble those feeds already scrambled. An insignificant percentage of the VC-2000 descramblers now going out may well be ending up in Canada or the Caribbean connected to TVROs feeding multiple TV sets. And as more and more of the premium and cable service channels do scramble this summer, we'll see a rapid increase in this sort of activity.



**FLAT OUT/** on my back for more than 5 hours while Luxor Attorney (left), STS Attorney (center) and Court Recorder (right) struggled through a deposition with me in my bedroom. Club Med would have been a more pleasant location.

### Suits And Depositions

With sales activity off there is apparently more executive time available to deal with more tedious things such as lawsuits. A number of suits are in various stages of discovery and pre-trial hearings these days. We wrote recently about the Boman 'win' over Chaparral in a suit originally brought by Chaparral. Most of the suits underway will not end so abruptly nor with so little fanfare.

If you have some special knowledge about some situation headed for a lawsuit, chances are you will be asked to either give a deposition and/or appear as a witness. I find myself in the deposition plus witness class for a pair of suits now headed for 1986 trial in our industry. On March 10th, after Patti and I flew to Provo for a couple of weeks of island work, we found ourselves facing a battery of attorneys and a court recorder person in our bedroom on Provo. It happened this way.

Luxor and STS (of Missouri) are involved in a \$20M pair of suits that date back to the separation of the two firms early in 1984. I had the misfortune to travel to Sweden at about the time this was happening, and with Luxor as my host, tour their facility there. I wrote extensively about that late in 1984 and the STS attorneys were anxious to turn some of my in-print observations around in their favor in their suit with Luxor. This resulted in my being asked (and then told) that they would take a deposition from me 'at my pleasure.' I figured nobody in their right mind would agree to travel to Providenciales in early March, stay at the fabled Club Med and actually take the deposition pool-side at Club Med surrounded by weird people who don't wear clothing. I neglected to explain the nude part and suggested that March 10th would

be a good date and Club Med on Provo would be a suitable location. To my shock, they agreed. I neglected to write it down in my appointment book, probably certain they would not make the several thousand mile trip. I was wrong.

On the appointed morning, Patti and I were searching for a doctor on Provo who would fix my back. The day prior I had forgotten everything I had ever learned about picking up boxes, stooped to lift 90 pounds of grass seed, and the next thing I remembered was standing in the same posture position as Rip Van Winkle and grabbing at the small of my back pointlessly. I couldn't walk, sit, crawl, stumble, or lay down. There are not many positions left open.

So, we missed our forgotten appointment at Club Med and there sat an attorney for Luxor (dressed in a suit), an attorney for STS (dressed less casually), and a young lady court recorder from St. Louis who had traveled 2,000 miles to record everything I said. Several hours later they caught up with me, humped over on a bed and generally feeling like a loser. For the next five hours I moaned, groaned, said a few audible words, and somehow got through the deposition. Patti videotaped it all just in case we ever want to relive the deposition. The tape could prove invaluable since I don't remember a single thing after they came into the bedroom.

I haven't seen the transcribed or written version of my 'testimony' yet so I don't know how long it ran. The present industry record would seem to be more than 1,200 typed pages transcribed from a deposition given by Larry James in the case involving the former principals of Satellite Financial Planning Corporation (SFPC) and a prominent bank in Delaware. SFPC is suing for a mere \$300,000,000 and the nature of their charges against the bank true. The potential rewards on this one are \$3,000,000,000 since the asked-for-damages multiply by 10 in this special situation. Three billion dollars is an interesting number.

Bill Young, the SFPC founder, told me that he was able to get his law firm to agree to handle the case on a contingency basis. That means the lawyers work essentially for free hoping that they will win and they will then share in the damages awarded. The law firm, Young says, previously sued AT&T for several hundred million bucks and won, so he figures he's dealing with strong legal people on his side. Contingency fees usually run in the 30-35% region. You can calculate your own percentages on the damages sought.

They sent me a copy of the Larry James deposition to read through. I could have read 'War and Peace' twice, in half the time. James was a major player in the SFPC operation and at one time did some writing for me in CSD/2 magazine. His remembrances of some of the people, problems, and whom he blames for the industry going to hell in a hand basket in 1984 or so make amusing reading. I will probably serialize some relevant portions of his testimony here in CSD shortly. Many thought James and Young may have been involved in the now infamous take of SPACE by Rick Schneringer back in February of 1983. I scoured his 1200 pages of testimony to see if I could find any mention of his part in that daring raid on SPACE that cost the trade association the legal right to the name SPACE.

The James deposition wanders from industry personality to personality in an often brilliant manner and with a little narrative help from me it might make the worst-seller list in the bookstores. If you are interested in a study of how people wiggle off the hook to avoid blame for their own actions, you will find our serialization of his deposition very amusing.

Oh yes. Any dealers out there who are still upset over some portion of the SFPC activity should write me a note detailing their remembrances of their problems with the SFPC program. In particular, if you have data that shows your approval time exceeded 72 hours, that the checks to be mailed to you never seemed to arrive, or that SFPC or the bank or anyone else hassled your customers directly by going behind your back, I'd like to hear all about it. There may be a part of that \$3,000,000,000 for dealers if we can figure out who wronged whom, the worst, here.



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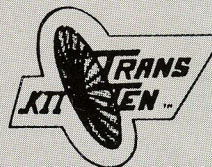
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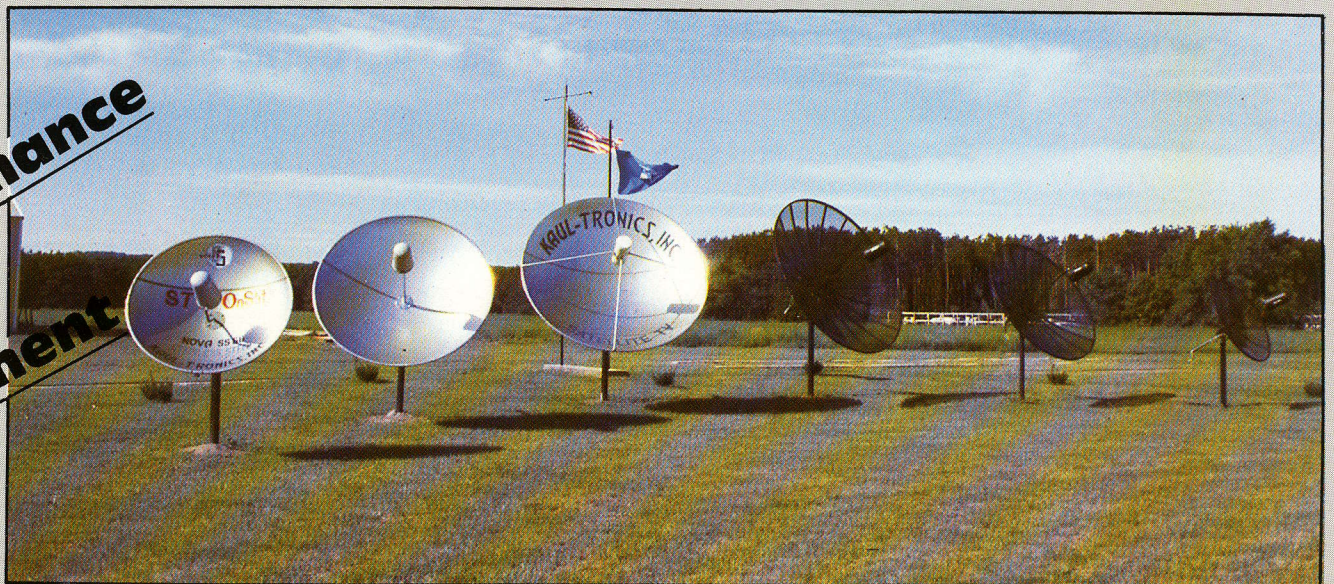
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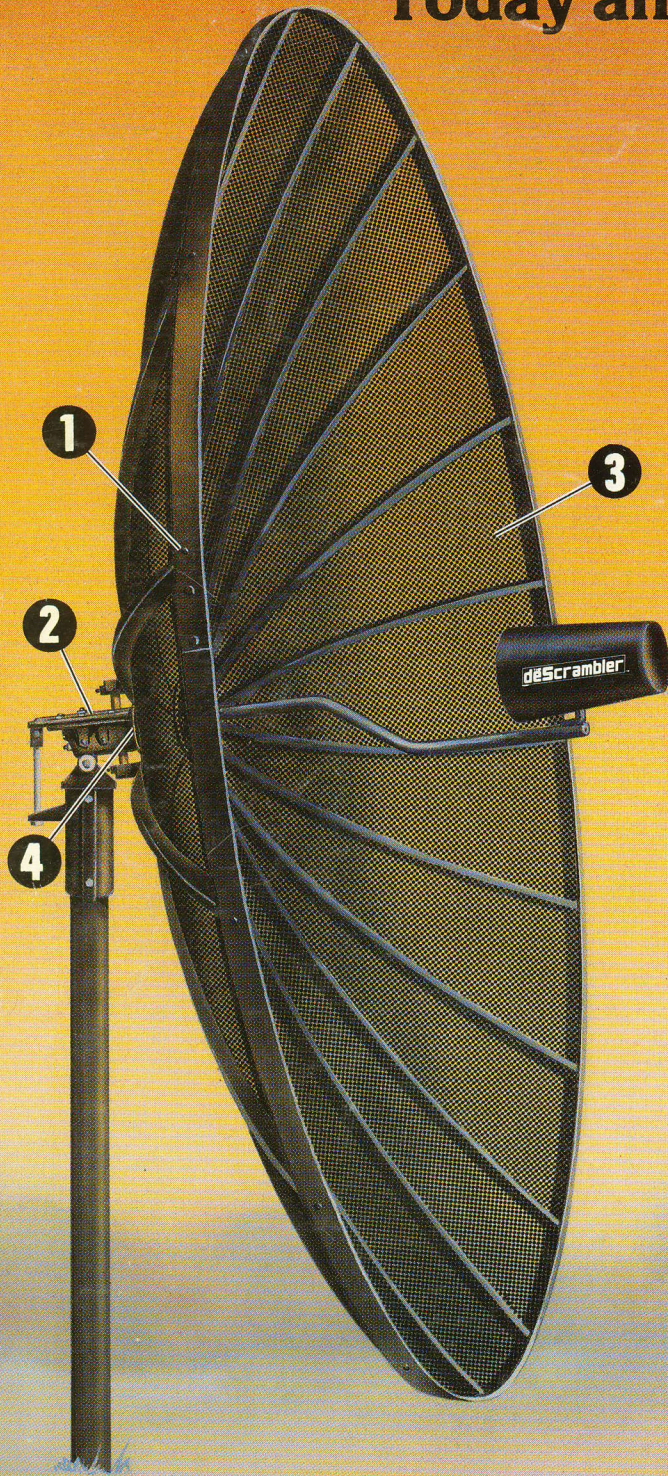


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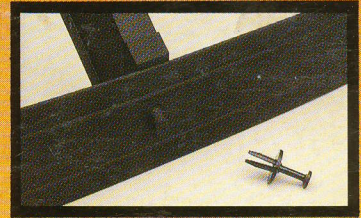




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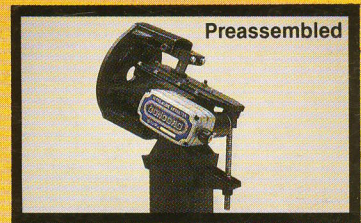


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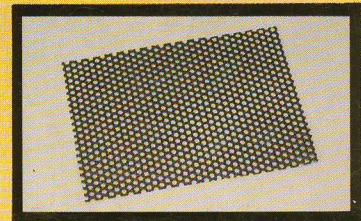
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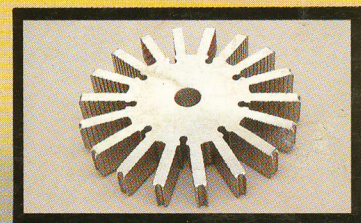
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